MAR 19 1926

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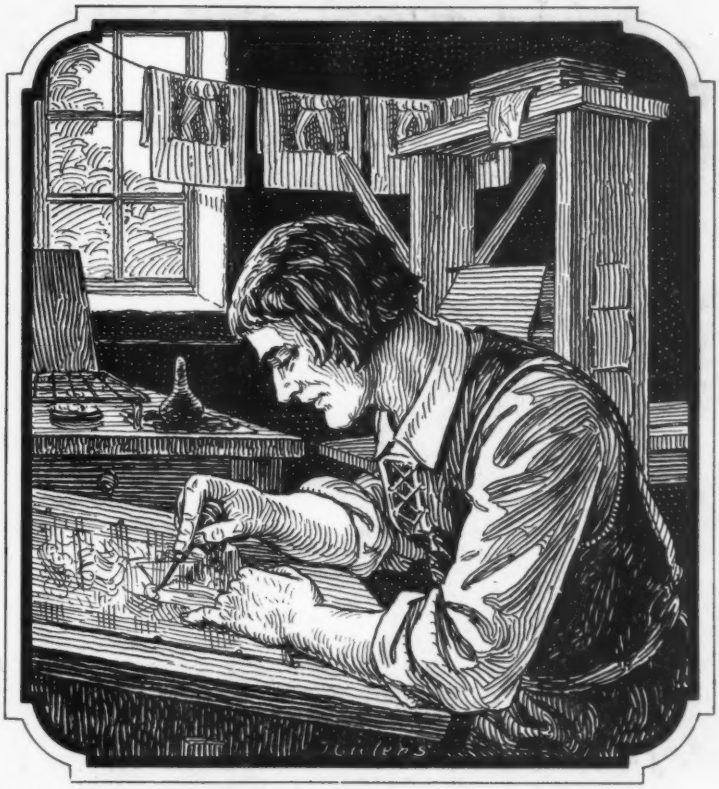
The INDUSTRIAL-ARTS MAGAZINE



APRIL - 1926

The BRUCE PUBLISHING COMPANY
MILWAUKEE, WISCONSIN

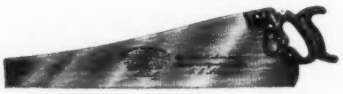
ATKINS SILVER STEEL SAWS

NOTHING SUCCEEDS LIKE SUCCESS AND SUCCESS CAN BE HAD WITH ATKINS

Atkins Always Ahead

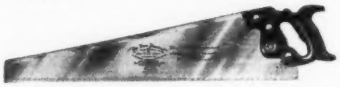
Atkins Silver Steel Narrow Band Saws are recommended for better and accurate work. Made in widths of ⅛ to 1¾ inches. Try a pair.

The Finest on Earth



"THE 400" SHIP PATTERN

"The 400" is made of Silver Steel, Mirror Finish, Solid Rosewood handle Perfection Pattern, which prevents wrist strain.

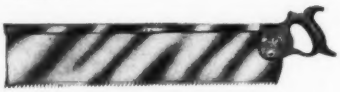


ATKINS No. 53 REGULAR PATTERN

A most popular Atkins saw, No. 53, Silver Steel blade, Damaskeen finish, handle of Applewood, Perfection Pattern, embossed. Each work bench should have a No. 53.

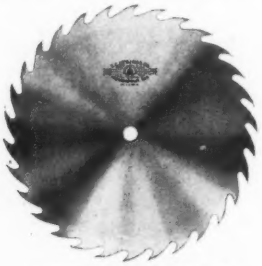
ATKINS No. 3 NEST OF SAWS

Atkins No. 3 Nest of Saws is very popular in schools where high grade tools are appreciated. 12 inch keyhole blade, 14 inch Compass blade, 18 inch Metal Cutting blade, with interchangeable handle.



ATKINS No. 1 MITRE SAW

The fine quality of Atkins Silver Steel is also found in our Mitre Saws. 4 inches to 6 inches under back to tooth edge and in lengths of 18 inches to 32 inches. Genuine Applewood handle.



ATKINS SOLID TOOTH CIRCULAR SAWS

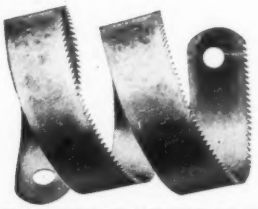
For your circular saw table Atkins Silver Steel Circular Saws cannot be beat. The results from using Atkins will prove absolutely that they are "The Finest On Earth."

ATKINS GRINDING WHEELS

Acrolite Grinding Wheels for saws, knives and tools. Ferrolite Grinding Wheels for brass, copper, chilled iron, etc. Send for our Grinding Wheel book.

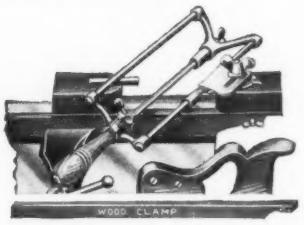
ATKINS BLUE STAR KNIVES

Atkins Blue Star High Speed Steel Knives; the latest development in high grade machine knives. They have no equal for wearing and cutting qualities.



ATKINS NON-BREAKABLE BLADE

To those who have suffered a heavy loss on account of breakage the Atkins Non-Breakable Hack Saw Blade will prove extremely profitable.



ATKINS HAND-SAW FILER

Every school should have at least one Atkins Hand Saw Filer. Easily operated by the youngest mechanic.

Leading Manufacturers of Saws, Saw Tools, Machine Knives, Grinding Wheels, and Distributors of Cantol Belt Wax. Send for second edition of our No. 19 Catalog, 264 pages, also write for literature.

E. C. ATKINS & COMPANY

Established 1857 — ***The Silver Steel Saw People***

Machine Knife Factory: Lancaster, N. Y.

Home Office and Factory: INDIANAPOLIS, IND.

Canadian Factory: Hamilton, Ont.

Atlanta, New York, New Orleans, Minneapolis, Seattle, San Francisco, Portland, Memphis, Chicago, Vancouver, B. C., Paris, France

Stretch that Appropriation By BUYING RIGHT

HOW do you buy? Pick up a half-pint of this and a gallon of that as you need it? Or, just tell Jones' Paint Store to send up this assortment of Nameless Varnish and any kind of Enamel? And then wonder why the boys have trouble and where the money goes?

Why not use JOHNSON'S WOOD FINISHES at SCHOOL PRICES? Get the highest grade materials made, purchase them in quantities and save money.

Johnson quality is unsurpassed. You probably have used Johnson Wood Dye and Johnson's Wax for years. The entire Johnson line is the kind of reliable trouble-proof material that actually helps "teach". It includes:

VARNISHES	FILLERS	ENAMELS
UNDER-LAC	WAXES	UNDERCOATS
WOOD DYES	(both OIL STAIN and SPIRIT STAIN)	

Write for Johnson Catalog and School Prices Today!

Redecorating?

In addition to regular shop supplies, we make a complete line of Interior Finishes including Flat Wall Finish, etc. School boards planning on redecorating either now or during the next vacation can make material savings by buying Johnson Materials. Just check the third space on this coupon and let us send you all information.

S. C. JOHNSON & SON, Dept. I. A. 4 RACINE, WIS.
"The Wood Finishing Authorities"

☐ Please send specimen set of Johnson Job Sheets.

☐ Also include latest Johnson School Price List on shop materials.

☐ We are redecorating school buildings in the near future and are interested in saving money on decorating materials.

NAME .....

POSITION .....

SCHOOL .....

CITY & STATE .....

Millers Falls Ratchet Brace No. 772

Improved chuck with rectangular opening; holds bit shanks, round from ⅛" to ½" and No. 1 Morse taper shanks. Ball bearing head, full steel clad. Cocobolo head and handle. Handle has inserted metal rings. Exposed metal parts nickel plated and buffed. 10 inch sweep—also made with 8 inch to 16 inch sweep.

When it comes to *boring holes—!*

DRIVING nails and boring holes—boys are keen for that sort of activity. But they do need training in doing things *right* with the right tools.

Of course every Millers Falls tool is the right tool for its job—and that's most particularly true of Millers Falls Braces. Ask a dozen carpenters picked at random—they'll tell you.

For almost 60 years Millers Falls Braces have been leaders—and No. 772 is the finest of the flock. Read the specifications. One of 80 numbers, so no matter what your need, there is a Millers Falls Brace for it that's right. Right for good work, right for good training.

Write for folder "Better Braces"—or for our complete catalog, if you prefer.

MILLERS FALLS COMPANY
MILLERS FALLS, MASS.

28 Warren Street
New York

9 So. Clinton Street
Chicago

MILLERS FALLS TOOLS
SINCE 1868

To help the man who writes specifications

FROM now till the end of the school year, items will be occurring to you that you'll need for the new term.

Instead of jotting down a lot of miscellaneous memoranda that get mislaid and lost—

Disston has provided a new, easy way to record each need as it comes up.

A specification folder . . . . containing complete information as to size, type and quality of the finest tools made for school use.

It is arranged in convenient form. All you need do is fill in the quantity and draw a circle around the size and type you decide to specify. (See model below.)

Then when you are ready to make up your specification sheet for bids your work is practically done. Just hand your typist the folder to copy off the items marked.

You save time. You save work. And, more important even, you are sure of getting Disston quality, without substitution.

Send for this folder now. Just sign and mail the coupon.

HENRY DISSTON & SONS, INC., Phila., U. S. A.
Makers of "The Saw Most Carpenters Use"

How to Use the Specification Folder

Suppose you find you will need new try squares next term. Turn to "try squares" on the inside of specification folder; decide from the descriptions which model you want; then fill in the quantity, draw a circle around the size and type (see below), and that item is safely recorded and off your mind.

Recommended for 24-Bench Shop	Item	Specify Quantity Here	Title	Draw circle around the size desired
24	Disston Try Square No. 5½	24	Try Squares	(6") 8" 10" 12"
Choice of 2 models				
We recommend No. 5½	Disston Try Square No. 15			

Draw a circle around the model you want

Disston No. 5½ — Toughened steel blade, graduated and numbered from head to end. Nickel plated iron stock.

Disston No. 15 — Toughened L-shaped steel blade extends entirely through rosewood handle. Heavy brass face plate ungraduated unless specified.

Henry Disston & Sons, Inc., Philadelphia, U. S. A.

Send me the Specification Folder that will save time and work in making up my specification sheet.

Name .....

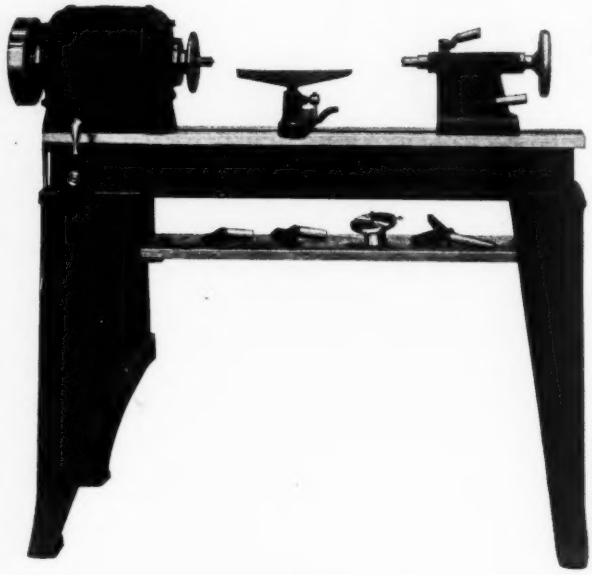
Address .....

.....

DISSTON

BLOUNT Motor Headstock LATHES

"Have proven their worth by their Service"



Characteristic of these lathes are the following excellent features:

Simplicity of design . . Accessibility

Sturdy construction and great strength

Extra heavy bed

Rigidity and freedom from vibration

Greater load capacity due to extra large ball bearings and spindle

Smooth, quiet running

Ease of operation

Safety

The outstanding reputation for satisfactory service of Blount Motor Headstock Lathes has been achieved solely by the maintenance of the highest standard of quality in their design and production.

Descriptive literature sent on request.

J. G. BLOUNT CO., EVERETT, MASS.

Detroit, Mich. Schools
Use STA-WARM GLUE Pots

Detroit, the capital of the automobile world, the city where things electrical and mechanical are completely understood—uses

Sta-Warm

Electric Glue Pots

in the public school shops

It's better to be safe than sorry

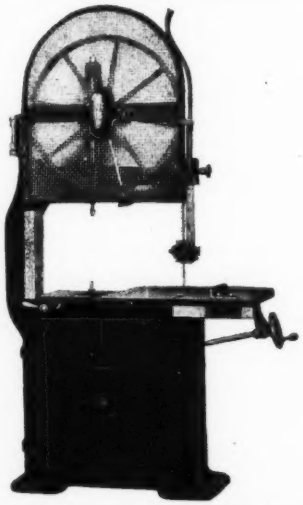
Order one or more STA-WARM glue pots NOW.

ONE Reason Why —The STA-WARM glue pot distributes its electric heat evenly over the walls of the pot — replacing the ancient glue-destroying water jacket as a modern "straight-eight" replaces the obsolete one-cylinder automobile.

STA-WARM ELECTRIC HEATER CORPORATION

2422 - 25th Ave. So. Minneapolis, Minn.

NEW NO. 185 BAND SAW



With babbitted or ball bearings

No. 185 New Model Band Saw is a medium weight, easy running machine. It embodies all the latest improvements. Built in two sizes, 30 and 36 inch.

Request complete description

Hall & Brown Wood Working Machine Co.

Broadway, Tyler and Ninth Streets

ST. LOUIS, U. S. A.

SIMONDS

For More Saw Service

School shops equipped with Simonds Saws—Narrow Bands, Circular or Hand, are getting greater service because these Saws withstand the wear and hold their edge longer. Planers running Simonds Knives will give more production and smoother work.

The New Planer Saw

This is a new type of circular saw, which makes practically as smooth a surface as when the wood is run through a planer. It stands heavy hand feed and does not burn the wood. Made from 6 inches to 24 inches in diameter. It cross-cuts or rips equally well. For fast results with hand feed get this saw.

Narrow Band Saws

Simonds Band Saws are made of tough steel that holds its edge and gives more service. They are carried in stock and you can get prompt delivery from any Simonds Service Station.

Planer Knives

Simonds are the largest makers of machine knives in the world. A Planer Knife bearing the Simonds Saw and Steel Co. trademark is guaranteed as to steel and mechanical construction. They hold their edge longer.

Blue Ribbon Hand Saws

You will make no mistake if you specify Simonds Blue Ribbon Hand Saws for school shop equipment. They are made of high grade steel that holds a keen edge under hard cutting conditions.

Order your equipment from Simonds

Simonds Saw and Steel Co.

ESTABLISHED 1832 — FITCHBURG, MASS.

CHICAGO, ILL.
BOSTON, MASS.
DETROIT, MICH.
NEW YORK CITY
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LOCKPORT, N. Y.
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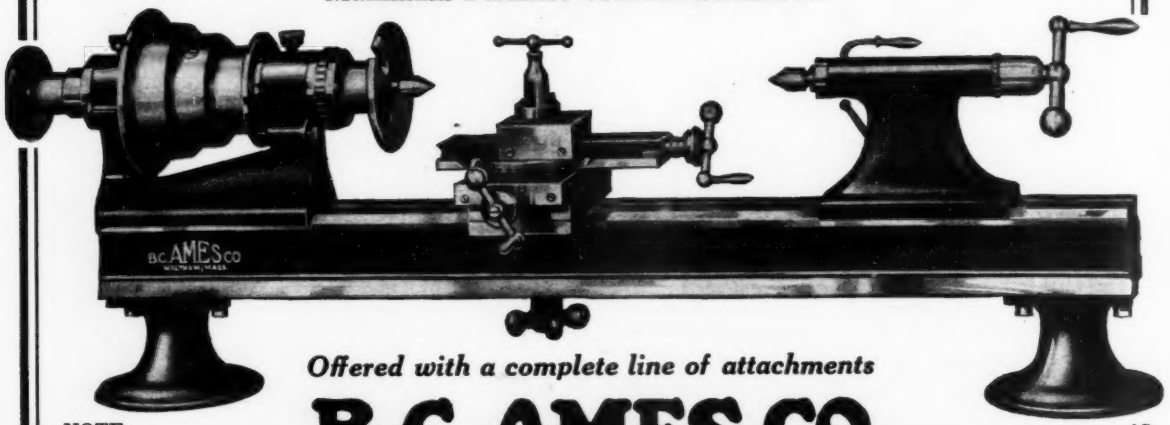
AMES BENCH LATHES

The ideal small precision lathe for every school shop—Practical and accurate

Used for Turning–Drilling–Milling–Thread Cutting–Grinding–Filing–Polishing

Length over Bed 36″ Swing over Bed 8⅜″

Maximum Distance between centers 21″



Offered with a complete line of attachments

NOTE:
"The Bench Lathe at Work"—a practical 32-page text book, will be supplied in quantity for class room use.

B.C. AMES CO.
Waltham, Mass.

SEND FOR CATALOG

Good tools help make good workmen

Here is a high speed ball bearing lathe which proves that safety is not incompatible with high speed, accurate work, and pleasing design.

While primarily designed for use in manual training schools, it is capable of turning out work which would delight the heart of the most fastidious craftsman. We sell many to schools on the basis that respect for good tools is an important part of any course in manual training.

The same high standards make "American" saw benches, planers, jointers, band saws and workers preferred by instructors who want their students to have the best there is.

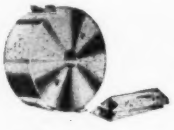
Write for free booklet.

AMERICAN SAW MILL MACHINERY CO.
74 Main St., Hackettstown, N. J.
1374 Hudson Terminal Building, New York City
American Manual Training Equipment

Improve Your Shop Equipment

Huther Bros. Dado Head

A Huther Brothers Dado Head will speed up and simplify your intricate cutting and grooving. It consists of two outside cutters and enough inside cutters to perform the required cut. The cutters can be used in pairs or in any combinations desired.



Huther Bros. Cutter Head

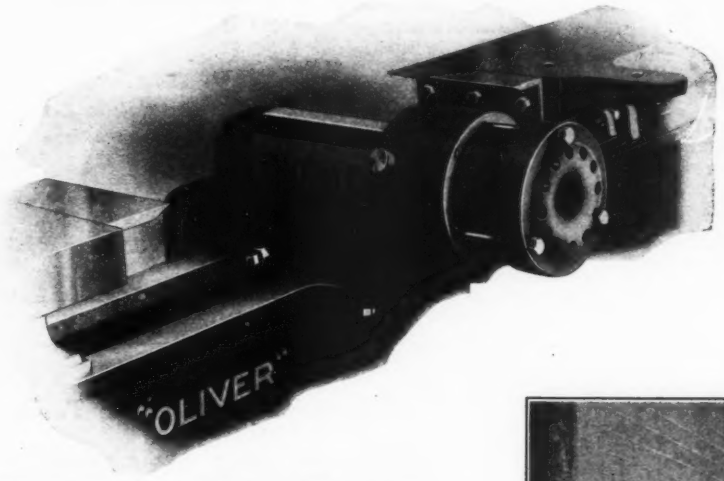
Huther Brothers Round Cutter Head is especially desirable for jointing and running light mouldings on saw mandrels. The knives are set with the use of a headless set screw and flanged side plates strengthen the head and keep knives from twisting while being set.

HUTHER BROTHERS SAW MANUFACTURING COMPANY
Rochester, N. Y.

Makers of Better Saws for More Than 50 Years

Write for catalog No. 46 illustrating and describing the entire Huther Line.

"Oliver"



Leading Schools Everywhere Choose "Oliver" Woodworking Machinery.

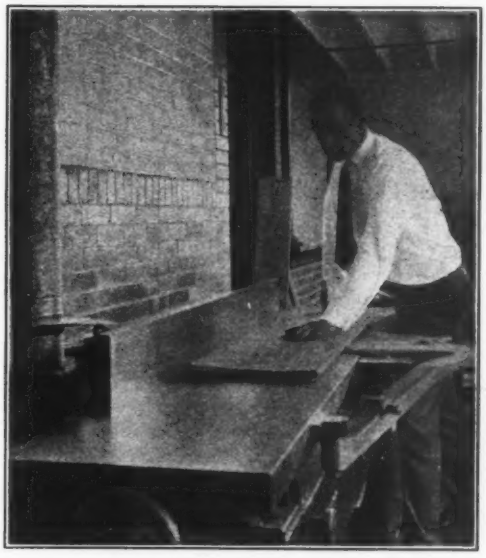
Here are a few Reasons

"Oliver" was the first Machinery Manufacturer to equip Manual Training Shops. They were first to study into and meet the needs of the schools.

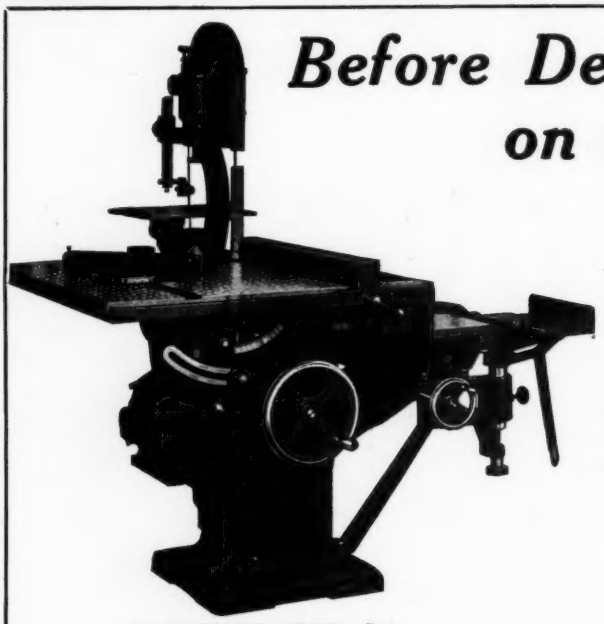
This gave early Leadership to the "Oliver" Line and this leadership has never been threatened. "Oliver" Woodworking Machinery is the most advanced in design and safest to operate in school or industry.

There are "Oliver" equipments in your district. Inquire where they are and let "Oliver" customers tell you why they buy from

Oliver Machinery Co.
Grand Rapids, Mich.



"Oliver" No. 166 Jointer, 16-inch, at the Western State Normal, Kalamazoo, Mich. This school is equipped with Oliver Machinery. They are proud of their equipment and Oliver Machinery Co. is, too.



TANNEWITZ MODEL E-2
COMBINATION WOODWORKER
Without Band Saw and Mortising-Boring Device—Model E

Before Deciding on the Equipment

By all means write for the facts and specifications of the Tannewitz Combination Woodworker. With these before you, we sincerely believe you are bound to agree that this machine offers a splendid opportunity of soundly economizing in the equipping of any woodworking department whether large or small.

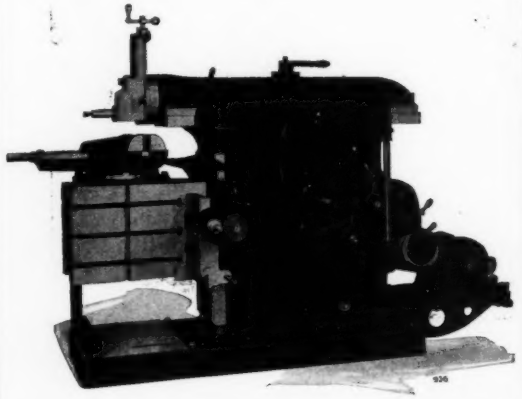
The bulk of woodworking operations can be performed on it just as they are done on the individual machines. It is built like the finest shop equipment by a firm whose name is a symbol of quality equipment in the woodworking industry. The large number of these machines now in use testify to their thorough practicality.

Just a line requesting Bulletin E-2 will put you in possession of the complete facts.

THE TANNEWITZ WORKS
FRONT AVE., GRAND RAPIDS, MICH.

"OHIO" PLANERS and SHAPERS

Suitable for Tool Rooms, Production Shops and Vocational Schools.



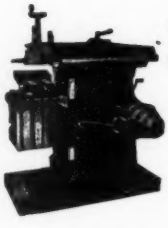
The Ohio Machine Tool Co.
Planers and Shapers since 1887
— KENTON, OHIO —

1845 — EIGHTY YEARS — 1925
Manufacturing Machine Tools

14"x6'—$450.00
16"x6'—$500.00
With Quick Change Gear Box
$85.00 extra

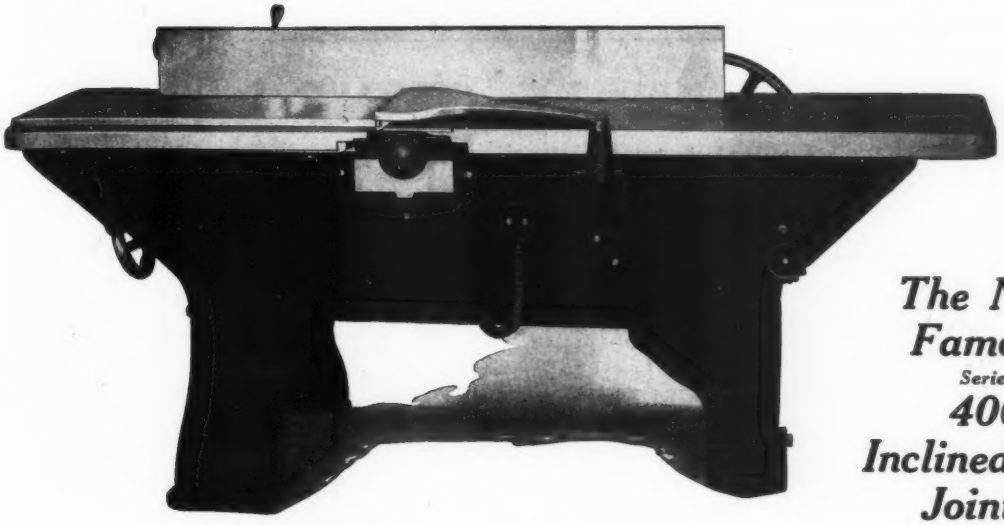
Thousands in use in shops all over the world giving daily satisfaction.

Meet the requirements of school shops because they are devoid of intricate parts and practically fool proof.



Send for catalogue describing the entire line of SHAPERS, MILLING MACHINES, LATHES and PORTABLE ELECTRIC SCREW DRIVER.

Industrial Education Dept.
THE JOHN STEPTOE CO.
CINCINNATI, OHIO



The New Famous Series 400 Inclined Bed Jointer

A New and More Efficient Jointer

Manual training teachers will be quick to appreciate one feature of this new inclined bed jointer. The long incline of the bed gives it a very rigid support, making it almost impossible to get out of alignment. This feature is a decided advantage over those machines having a more sensitive adjustment and consequently more difficult to keep in alignment.

And this is only one of several features which make the New Famous Series 400 Jointer especially adapted for use in Manual Training Schools.

It embodies all that 22 years of experience have taught us about woodworking machine efficiency. Not only does it meet every demand for hair line accuracy and ease of adjustment but it also includes the all-important feature of SAFETY, so essential in School work.

Special Features

4 knife round safety cylinder —with positive lock to knives.

Chip breaking groove in head —insuring smooth jointing.

Entire head unit built for either direct motor drive or belt drive.

Rear table locked in permanent alignment—easily adjustable to and from knife.

Push button within easy reach.

Aluminum Jointer Guard easily dropped to adjust knives.

3 point suspension—pivot leg easily leveled on uneven floors.

SKF deep groove, precision type ball bearings throughout.

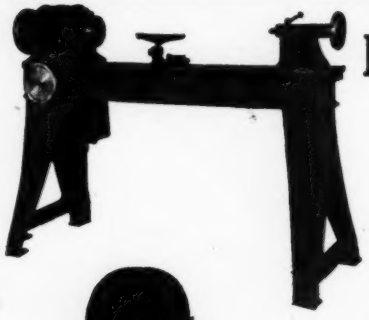
12", 16" and 20" sizes.

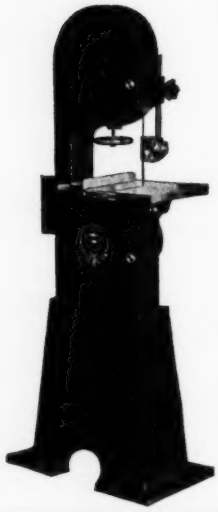
FAMOUS Line

New illustrated bulletin now on the press. Write today for your copy and for reasons why this FAMOUS Jointer is the one you should have in your school. Address Dept. 404.

The Sidney Machine Tool Co., Sidney, Ohio

SIDNEY SERVICE





LITTLE GIANT LATHES and BAND SAWS

are better, and you decide for yourself

We ship to you direct from the factory, and then you have 30 days in which to test these machines without cost. If then they are not satisfactory we take them back and pay freight both ways.

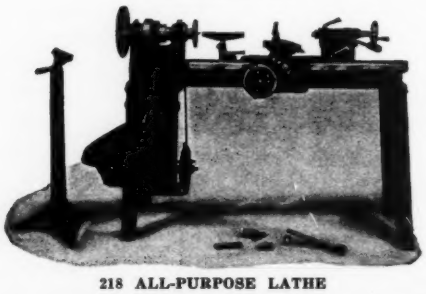
First send for our catalog which contains detailed description and accurate illustrations, and then when you are ready for bids send us specifications.

We will put in Bids that will be worthy of consideration.

LITTLE GIANT COMPANY

223 ROCK STREET MANKATO, MINNESOTA

GTD



218 ALL-PURPOSE LATHE

INTERESTING WORK

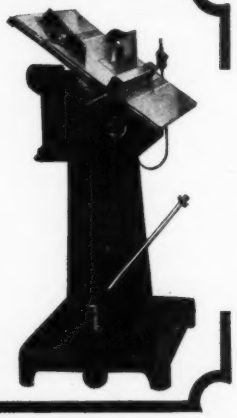
Here is a machine calculated to bring out the best in every boy. A machine that holds his interest and makes him enjoy his work. Many interesting articles can be made with the help of the GTD all purpose lathe, such as baseball bats, candle sticks, table and chair legs, hat trees, floor lamps and hundreds of other items.

For complete description write for bulletin No. 104.

GREENFIELD TAP AND DIE CORPORATION
GREENFIELD, MASS., U.S.A.

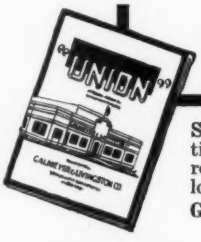
School Representatives
R. A. FIFE CORPORATION, Mamaroneck, New York

ADVANCED!



Union machines embody the latest ideas worked out by specialists in modern woodworking practice.

They are better in woodworking plants and better in schools for the same reasons.



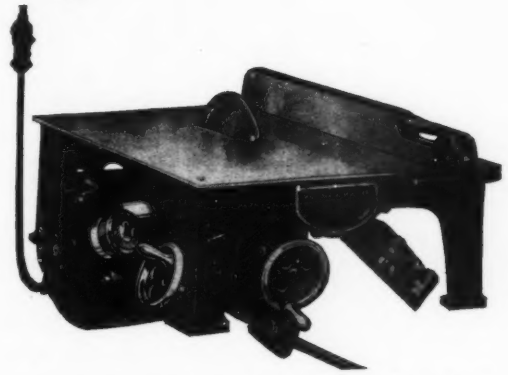
Speed, accuracy, compactness, low initial and upkeep costs are but a few reasons why you should have our catalog. *Write for it.*

GALLMEYER & LIVINGSTON CO.
212 Straight Ave.
GRAND RAPIDS, MICHIGAN

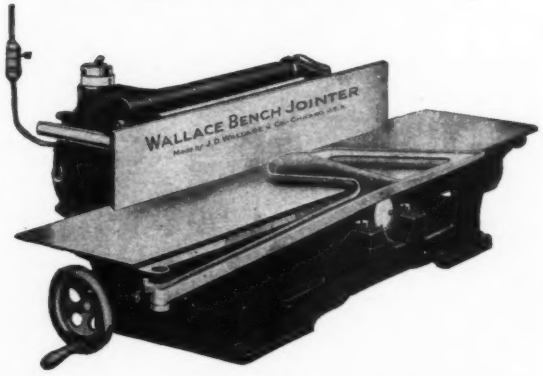
UNION PORTABLE AND BENCH TYPE WOOD WORKING MACHINES

Wallace
PORTABLE MACHINES

Wallace 16" Band Saw
Wallace Universal Saw
Wallace Plain Saw
Wallace 6" Jointer
Wallace 4" Planer
Wallace 6" Lathe
Wonder Spindle Sander
Wonder Disc Sander
Wallace Electric Glue Pot—Automatic Heat Control



Instructors and students alike, in hundreds of schools, have found Wallace Woodworking Machines ideally suited for practical training purposes as well as for the actual production of useful and efficient furniture, etc.



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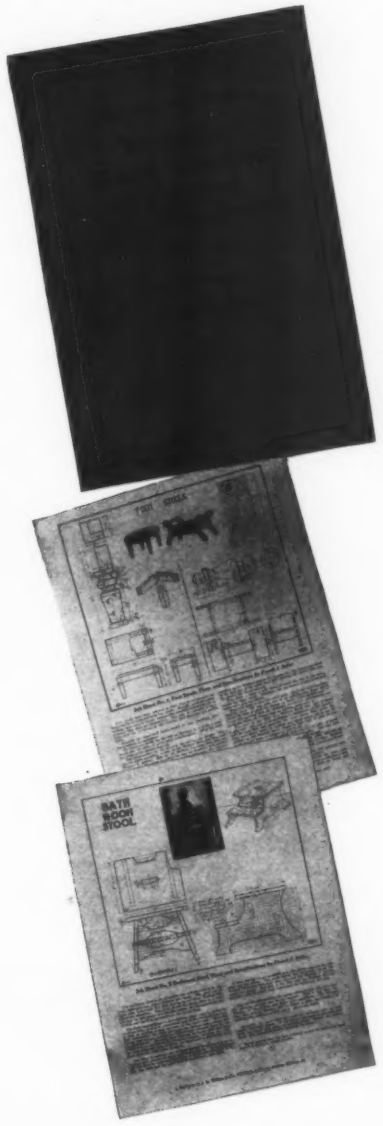

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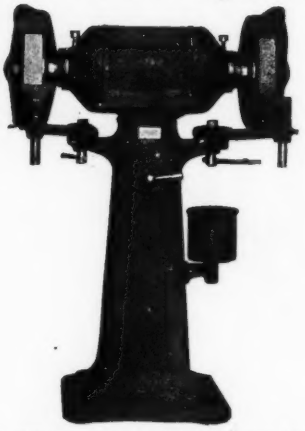

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Keep the tools sharp

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It is motor driven, ball bearing throughout, and every unit is thoroughly guarded.

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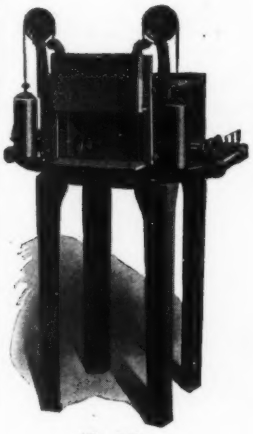

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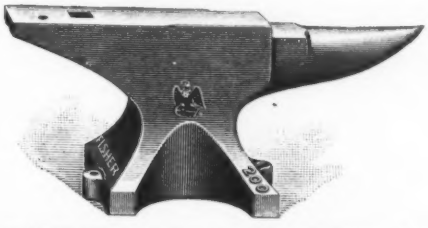

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— A FEW OF THE MANY USERS —

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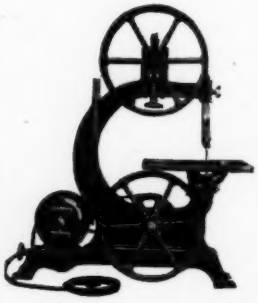

1. More machines for the same money.
2. More students an opportunity to obtain machine experience.
3. Cheaper operation and maintenance of machines.
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6. Larger variety of woodworking machine experience.
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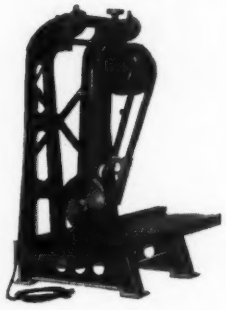
Ample Power - Accurate Work - Low Costs.



Any school can make their Manual Training Department more efficient with a number of these bench machines in place of a few massive machines.

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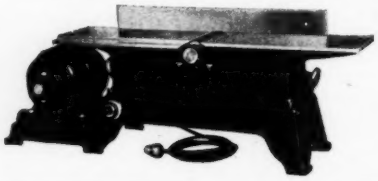
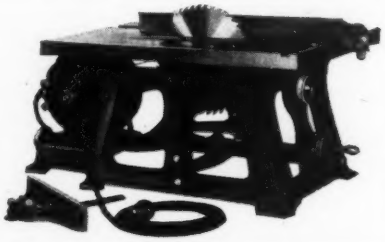
These machines are large enough to handle any work usually done in Manual Training classes. They are equipped with motors that will insure plenty of power for all work within the range of the machine. Each machine has guards (not shown here) that fully comply with the laws.

These machines are built to quality standards that guarantee accuracy in operation. Low costs are maintained by improved designs and methods of manufacture.





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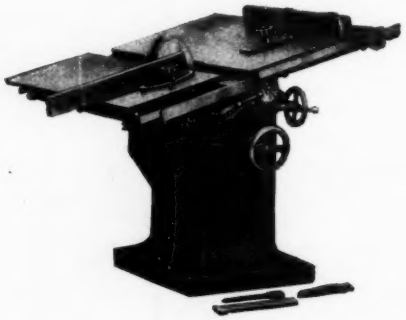

The No. 10 Crescent Saw Table is a sturdy, substantial machine with every convenient adjustment for general factory work and will meet every requirement for a practical saw table with self-contained motor for your manual training department.

Send today for circular giving complete description. Also ask for circular of band saws, saw tables, shapers, jointers, variety wood workers, planers and matchers, disk grinders, cut off table, swing saws, borers, hollow chisel mortiser, tenoner, universal wood workers, self feed rip saw.

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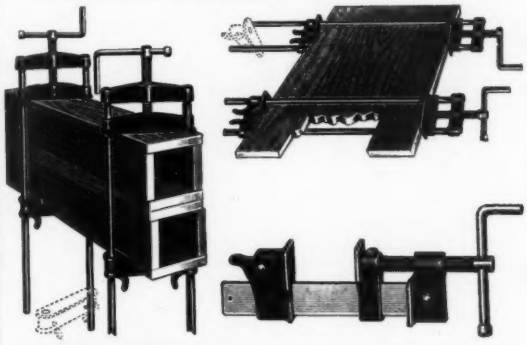

HARTFORD No. 6 Double Bar Clamps are used extensively as presses — for veneering, gluing posts, chair arms, etc. The cost is much less and the saving worth your consideration.

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Maydole Hammers — YOUR HAMMER SINCE 1843

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Sharpen Edge Tools

on a LUTHER TOOL GRINDER

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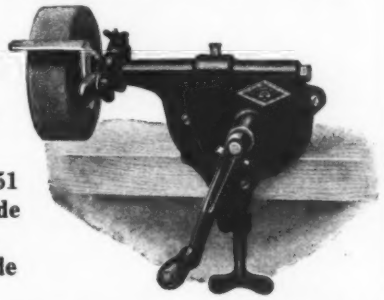

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Manual training instructors, skilled mechanics, carpenters and pattern makers have found that Luther Grinders are the safest and most practical tool grinders made—excellent design and workmanship—a real quality product.

Grinder illustrated is our No. 51 Best Maide, ball bearing, swivel type hand grinder, equipped with combination (medium and fine) grinding wheel, especially adapted for grinding edge tools. No. 51 is equipped with 5x1½x⅞" DIMO GRIT grinding wheel and plain tool rest.

A special chisel and plane bit holding attachment can be furnished — insures uniform, accurate hollow ground bevel always.

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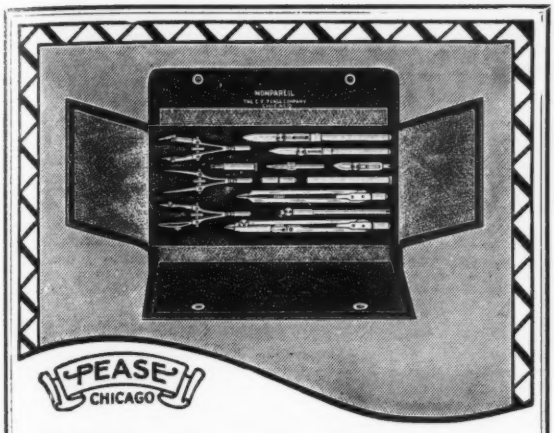

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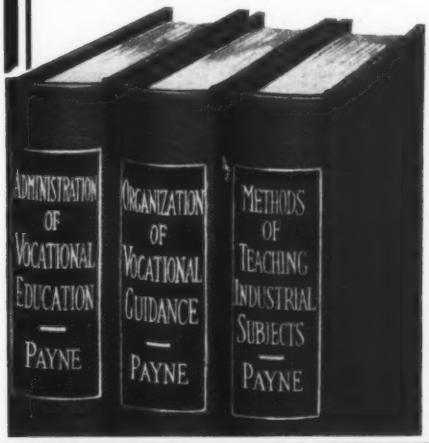
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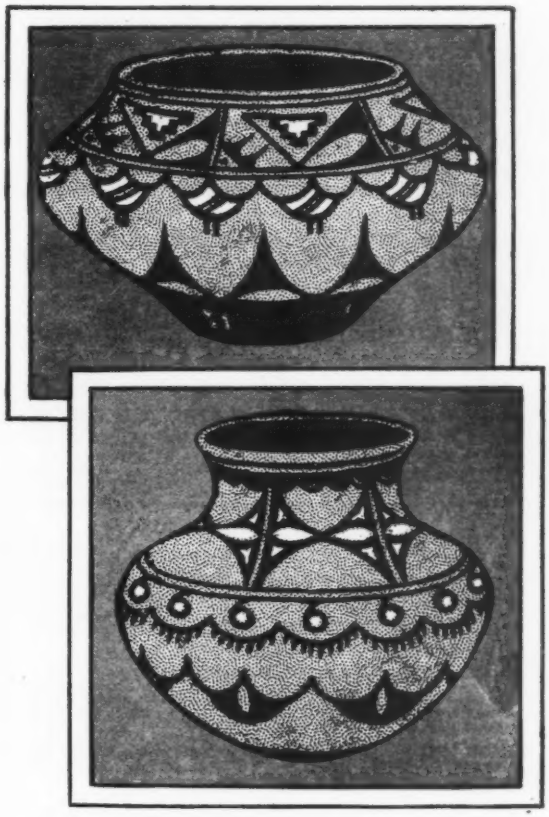

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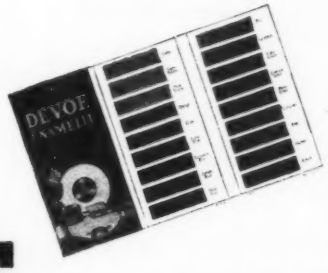

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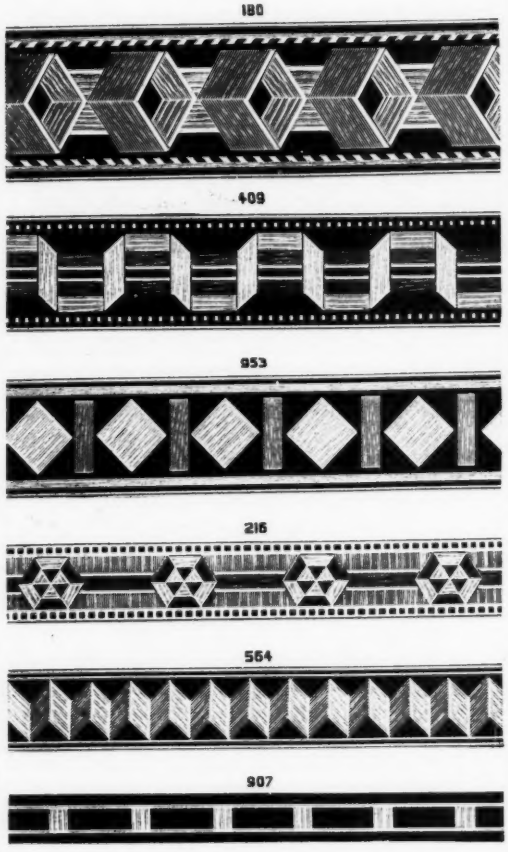

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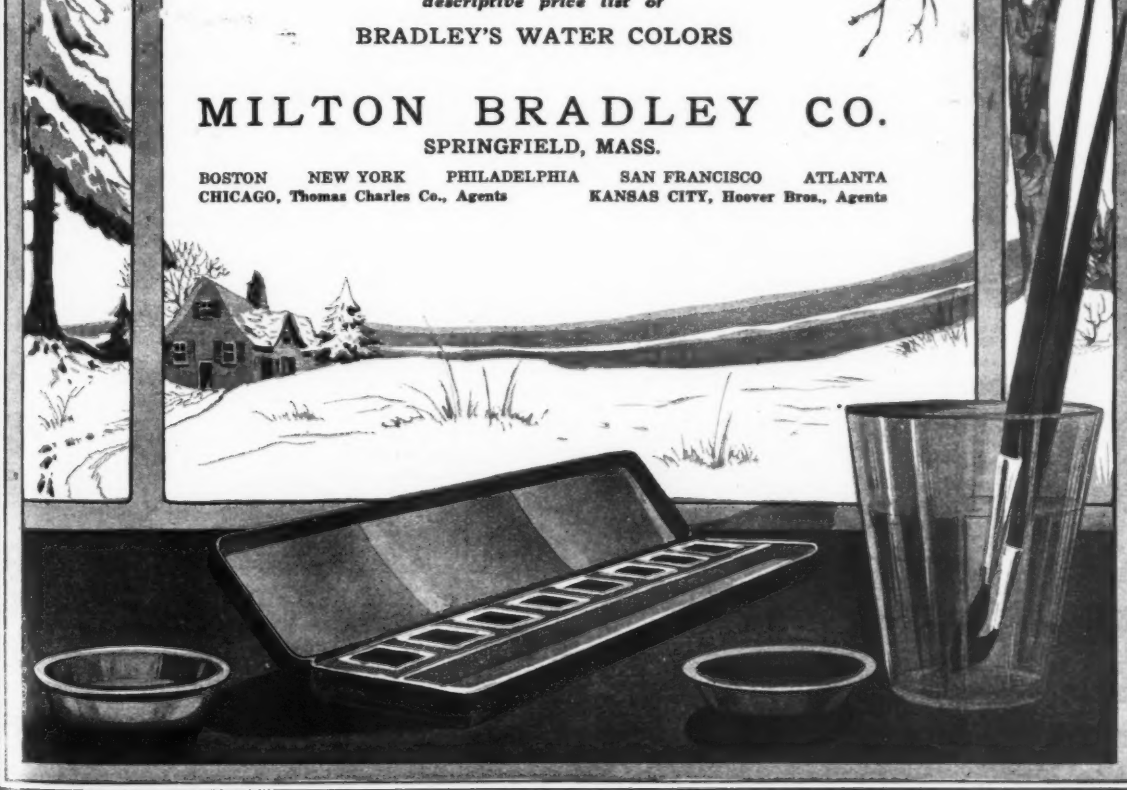

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Vol. XV
No. 4

INDUSTRIAL-ARTS MAGAZINE

April,
1926

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The Eastern Arts Association will hold its seventeenth annual meeting April 21st to 24th, at Syracuse, N. Y.

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Others who will bring interesting and helpful messages are Mr. Lewis A. Wilson, Mr. Harry Jacobs, and Mr. E. E. Roberts.

Arrangements have been completed for a members' exhibit.

The several eastern passenger associations have announced special railroad rates.

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THE INDUSTRIAL ARTS MAGAZINE

Volume XIV APRIL, 1926 No. 4

The Training of Junior High School Industrial Teachers

Lynn E. Stockwell, Trade and Industrial Department, College of Education, University of Minnesota

SCHOOL AND PROFESSIONAL TRAINING

THE idea prevalent that industrial teachers are poorly prepared is the reason for this paper. It is important that industrial teacher be fully prepared, perhaps more so at this time than at any previous time in the history of the United States. The rapid strides made in industry, and the increasing significance of vocational education in our public school system, makes it imperative that the industrial work in the public schools be put on as real and firm a basis as possible. In order that this situation be realized the teachers must be well prepared.

The question often arises as to which is the better industrial teacher, the skilled artisan, or the professionally trained teacher. A great many educators contend that the artisan is the better teacher because of his skill gained in the trade and his vast knowledge of the trade while others claim that the trained teacher is better, even though knowing a great deal less about the trade than the artisan, because of his ability to present the work logically and clearly. When manual training was first introduced as a public school subject in Sweden, the same question arose and was tried out by Salomon.[1] The result was that the skilled artisan without professional training was dropped and the regular teachers were given a course in the trade they expected to teach and put in the places formerly held by the skilled artisans. During the World War, just past, the United States suffered a serious shortage of men industrial teachers because of the large number called into the service. Rather than drop the industrial work, skilled tradesmen were put in the industrial departments to take the place of the teachers called to the service. This was a general practice at that time. A supervisor of manual training in one of the largest cities in the middle west made this statement concerning the tradesmen employed by him in the emergency: "Of the five tradesmen employed by me during the war period, only one came through as a successful teacher in all respects. I think the reason for this man's success lies in the fact that he had had teaching experience before he entered his trade work."

A very important criterion of a successful teacher is the amount of training, and the extent of training, the teacher has had for the position he is filling. As a rule good teaching is the result of extensive and good training. The general agreement in regard to this question is that "adequate preparation usually means good teaching."[2] Another indication of the successful and conscientious teacher is the amount of training in service he is doing and his touch with problems in education.

The data as tabulated will show what the present practice is in employing industrial teachers for boys, as to school and professional training. The data gathered is shown tabulated in Table 1.

The divisions or groups of training have been set up as follows: Elementary school only, high school non-graduates, all high school graduates, high school graduates only, one-year normal or special school, normal or special school graduate,[3] one-year college or university, two-year college or university, three-year college or university, bachelor's degree, advanced degree. The data for the training in service is shown in the amount of summer session work, correspondence work, and extension work taken by the teachers. This data is shown tabulated in Table 2.

All cases not reporting entrance to, or completion of the high school, or any other higher institution were classed in the group "elementary school only." The next group was the "high school, non-graduates." This group included all of the cases which had attended high school but had not completed the regular four-year course leading to a diploma. The next group "all high school graduates" consists of all the rest of the groups combined, high school graduates only, one-year normal or special school, normal or special graduate, one-year college or university, two-year college or university, three-year college or university, bachelor's degree and advanced degree. The "all high school graduate" group was put in so as to make it possible to compare this

[1] Salomon, Otto—Theory of Educational Sloyd, Chapter XI, p. 68.

[2] U. S. Bureau of Education Bulletin No. 29, 1916.

[3] Two-year course required for diploma.

group with the cases not having had any high school training. The grouping above the high school is clear enough and quite definite without further explanation.

TABLE 1—School and Professional Training

	Number of Cases	Per Cent of Entire Group
1. Elementary School, Only	40	14.7
2. High School, Non-Graduates	42	15.14
3. High School Graduates, Only	23	8.4
4. One-Year Normal or Special School	7	2.5
5. Normal or Special School Graduate	99	36.4
6. One-Year College or University	4	1.4
7. Two-Year College or University	10	3.6
8. Three-Year College or University	14	1.4
9. Bachelor's Degree	36	13.2
10. Advanced Degree	7	2.5
TOTAL	272	99.2
1. All Less than High School Graduates	82	30.14
2. All High School Graduates	190	69.86
TOTAL	272	100.00

In discussing the data on school and professional training, no definite or standard requirements can be set up as this study covers a number of states and the requirements vary with the state. The general or most common requirements for industrial teachers will be set up. The state of Minnesota requires her industrial teachers to have two years special training beyond the high school.[4] This means that they must be high school graduates. Special certificates are issued, however, which tend to break down any good the higher requirements for certification may have done.

Out of the 300 replies but 272 could be used. Of this number there are forty who have had no high school training whatsoever. This figure translated into per cent means that 14.7 per cent of the entire group have had no high school training. Forty-two cases have entered high school but have not completed the course. This gives a per cent of 15.1 per cent of the entire group. This group was not divided into years because it was thought that there is very little difference between one-two, or three years in the high school. All high school graduates compose the largest group. It is represented by 190 cases and is 69.8 per cent of the total number of cases. This group includes groups four to ten inclusive, as shown in the table on school and professional training. Those who have graduated from the high school only are a small group, being represented by only 23 cases with 8.4 per cent of the entire group. Seven cases have had but one year in a normal or special school. This makes but 2.5 per cent of the entire group. The largest separate group is the group having completed a two-year normal or special school course. As stated before this group represents the general standard for certification of industrial teachers. It is composed of 99 cases making 36.4 per cent of the total number. The group having had but one year in a college or university is represented by only four cases which makes 1.4 per cent of the entire group. This group is closely allied to the group having had but one year in a normal or special school. The next group, two years in college or university, compares with the normal or special school graduates. Ten cases are found in this group making 3.6 per cent of the large group. There are but four in the three-year college or university group which makes 1.4 per cent of the entire group. There are 36 cases having a bachelor's degree. This represents 13.2 per cent of the large group. But seven have advanced degrees which makes 2.5 per cent of the entire group.

We find in the table on school and professional training that 167 cases have had some advanced training beyond the high school. This is 69.8 per cent of the total number of cases. This is an excellent showing but there is still room for improvement. The elementary school only and the high school non-graduate groups in all probability represent the older teachers.

From the above discussion and the table of school and professional training, one can say that the industrial teachers for boys in the Junior high schools are fairly well prepared to teach the industrial subjects. In spite of all that has been said regarding the preparation of industrial teachers, the training seems to be as well founded as the ordinary teacher.[5] Although ranking about on a par with teachers as a whole, this group is somewhat lower in training than the male teachers in the junior high school, as a whole. The median years of training for male junior high school teachers, as a whole, is 7.4 years beyond the elementary schools.[6] Another point in conclusion is that the industrial teachers are fully awake to the need of more and better preparation, as shown in the table on summer session work, correspondence work, and extension work.

TABLE 2—School and Professional Training

Training in Service Kind of Work	Number of Cases
Correspondence Courses	30
Extension Courses	68
Summer Session Work	73
Doing Nothing	103
TOTAL	274

One hundred seventy-one cases or 62.4 per cent of the entire group have taken part in some form of "training in service."

The data does not show when the training was taken, for that reason it can be used only as an indication, that the teachers have done something to improve themselves in service.

TEACHING EXPERIENCE OF INDUSTRIAL TEACHERS IN THE JUNIOR HIGH SCHOOL

In discussing the training of a teacher, the number of years' experience as a teacher must follow the amount of school and professional training the teacher has had. The data gathered, relative to teaching experience will be found in Table 3.

The larger cities, where the better and greater number of junior high schools are located, as a rule, require that the applicant for a teaching position in their school system have some previous experience in teaching. Usually two years are required.[7] This shows very clearly the need of experience in teaching. The experi-

[4]State of Minnesota, Department of Education, Bulletin, January, 1922, on "Law and Rules Governing Certification of Teachers." P. 18.

[5]Selke, Erich—Master's Thesis—Teachers of Minnesota—Unpublished. N. E. A. Report on Teachers' Salaries, 1919—E. S. Evenden, Teachers College, Columbia University.

[6]National Committee for Chamber of Commerce Cooperation with the Public Schools. Know and Help Your Schools, p. 23, table 13.

[7]Massachusetts Department of Education, Bulletin No. 5, 1921—Junior High School Manual, pp. 40-41, Committee of Fifteen appointed by the Commissioner of Education.

ence must be had but the larger cities would rather have the smaller cities do the seasoning.

Previous experience, in the majority of cases, goes hand in hand with better teaching. As the teacher gains additional experience, he becomes more sure of himself and the subject he is teaching and so will be able to present his subject more clearly and forcefully. His confidence in himself increases and he attacks and solves new problems more easily and readily.

From the table of teaching experience it is found that the column "years of experience" starts at one year. The reason for not having a number of years' experience column for no years was that only one case stated the fact that this was his first year of teaching experience.

From Table 3, we find that the greatest number of cases are at five and seven years' experience. The number of cases having had five years of teaching experience is 26 and the number having had seven years of experience is also 26. The next greatest number of cases appears at one year. The number in this group is 24. Twenty-two cases are found to have had eight years' teaching experience. Eighteen have had two years' experience and those having had ten years' experience are also represented by eighteen cases. At three years' experience the number of cases goes down to sixteen. Thirteen cases represent the group having had twelve years' teaching experience. Those having had nine years' experience are also represented by twelve cases. The number of cases having had eleven years' experience is ten. For fourteen and fifteen years' experience there are nine cases each. Eight cases each represent the groups having had thirteen and sixteen years' experience. The next highest group is those who have had but four years' experience, there being but six cases in this group. Two cases are found to have had 23 years of teaching experience. Seventeen to twenty inclusive, 22, 27, 28 and 42 years of experience are represented by one case each.

From the preceding discussion of the data gathered, one point stands out very clearly and that is that all but one of the cases, as stated previously, have had some teaching experience, varying from one year's experience up to the greatest number of years, 42.

In Table 3 on teaching experience it is found that the median number of years' teaching experience is 6.28 years. This is practically the same, except for slight variations, as found in several other studies,[8] for teachers as a whole. This group ranks slightly lower in teaching experience than for the entire group of male teachers in the junior high school. The median number of years' experience for the male teachers as a whole, in the junior high school, is 6.89.[9]

The reason that practically all of the cases have had some teaching experience may be due to the fact that

TABLE 3—Teaching Experience

Years of Experience	Number of Cases
1	24
2	18
3	16
4	6
5	26
6	19
7	26
8	22
9	12
10	18
11	10
12	13
13	8
14	9
15	9
16	8
17	1
18	1
19	1
20	1
22	1
23	2
27	1
28	1
42	1
Median Experience	Cases
6.28 years	274

when the junior high schools were established the teachers for them were taken directly from the grades and so of course had had some teaching experience. Again it may be that the school system does not take in inexperienced people, as is the case in Minneapolis where two years' previous experience is required for entrance to a teaching position.

Something must be done to increase the teaching tenure of industrial teachers in the junior high school. The present salaries, if maintained at the level where they now are, may tend to increase the industrial teachers' tenure of teaching. Again the recognizing of the teachers' job as a profession and elevating it to the plane where it rightfully belongs will also have a great effect on the teaching tenure.

From the preceding pages, the fact can be seen that the industrial teachers in the junior high schools measure up fairly well to teachers as a whole,[10] although not quite up to the standard of male teachers in the junior high schools as a whole.[11]

It may be said that the industrial teacher because of his extra trade training is better fitted than the academic teacher, provided the school and professional training are equal. However, that is an entirely different subject and deserves separate study.

[8]Coffman, L. D.—The Social Composition of Teaching Population, Bulletin No. 41, Teachers College, Columbia.
Evenden, E. S.—N. E. A. Report on Teachers' Salaries, 1919.
[9]National Committee for Chamber of Commerce Co-operation With the Public Schools—Know and Help Your Schools, p. 27, table 15.

[10]Evenden, E. S.—N. E. A. Report on Teachers' Salaries, 1919.
[11]National Committee for Chamber of Commerce Co-operation With the Public Schools—Know and Help Your Schools, p. 27, table 13.

Identifying True Mahogany. The ordinary purchaser of mahogany furniture is uncertain in his identification of mahogany, and is even less informed as to the source and nature of the genuine wood. The U. S. Forest Products Laboratory, in a study of the subject, has reported that mahogany is a name applied since the middle of the sixteenth century to a certain kind of wood coming from tropical America. The wood has been noted for its rich brown color, beautiful figure, lack of shrinkage, comparative freedom from warping, and easy working quality. The botanical name Swietenia has been given to the tree from which mahogany lumber is obtained.

It is brought out that there are five species of Swietenia entitled to the name mahogany. These species all grow in tropical countries and are not as yet differentiated by specific common names, so that one may receive any one of the species. Manufacturers frequently show preference for mahogany lumber from certain regions by specifying "Mexican," "Honduras," or "Cuban" mahogany.

After the true mahogany had become well established in trade, other kinds of lumber from the American tropics and from other parts of the globe, were placed on the market as mahogany, usually with a qualifying term. The special committee of the Forest Products Laboratory will eventually determine what kinds of lumber may be legally called mahogany in the trade.

Grading Teachers on the Basis of Tests

Thomas Diamond, Professor of Vocational Education, University of Michigan

THE need for standard measuring scales has long been recognized by the leaders in the various fields of education. The realization of this need has led to the development of numerous tests and scales designed for the purpose of measuring the measurable factors in education in a more or less scientific fashion. This article has to do with the use that might be made of the results obtained from tests of accomplishment in the fields of industrial arts and vocational education as a part of a plan for rating teachers.

One of the important tasks of a supervisor of industrial arts or vocational education is to determine the efficiency of each of his teachers, and to express his conclusions in terms of the rating system approved by the organization of which he is a part.

A method in common use—if it can be dignified by this name—is for the supervisor to arbitrarily rate each teacher on the basis of his personal reaction to that teacher. Others consider that they are being more liberal when they add their own personal reaction to that of the principal of the school in which the teacher is located, and divide the sum by two. These practices are much more common than many of our supervisors would admit, and it is believed that those who practice them do so with a firm conviction that the relative abilities of their teachers have been accurately set forth in each report submitted to the office of their superintendent.

In order that a supervisor may be free from the criticisms which are sure to follow rating of this kind, and in order that he may be able to justify on a specific basis any rating given, it is believed that he must determine the factors which he thinks should be, and can be, measured. These factors should be known and thoroughly understood by the teachers being rated, and the supervisor should make it a point to inform each teacher regarding those on which he is considered strong, as well as on those on which he is weak.

Mr. L. R. Abbott, director of industrial education and manual arts, Grand Rapids, Michigan, interested his teachers recently in this matter and invited them to determine the factors upon which they believed they should be rated. The form shown below is the result of the conferences held to discuss the question. The supervisor has approved of their conclusions, and the form has been adopted as the official rating sheet in the department concerned.

The following quotation from a report by the chairman of the committee appointed by the teachers gives some idea of the method used in determining ratings in each division: "It will be noted that the items considered are divided into two main divisions, majors and minors, and each of these divisions have their respective subdivisions. In order that the form may be used effectively it is essential for principals and supervisors to cooperate very closely on the three first subdivisions under 'Professional Attitude,' while the balance of the rating program is left quite generally to the personal contact of the supervisor with the individual instructor."

Manual Training Rating Sheet

Name.....192....
School..... Grade.....Hour.....
Rating.....

Note—Two markings in checking column: X = failure; + = passing. For satisfactory rating—eight majors and five minors.

Majors	Observations	Check Column	Remarks
1. Professional Attitude	Regularity of Attendance		
	Punctuality		
	Cooperation		
	Self Improvement		
2. Discipline	Self Control		
	Class Control		
3. Instructions	Use of English		
	Knowledge of Subj. Matter		
	Definite Planning of Work		
	Presentation		
	Class Spirit		
Minors			
1. Personal Attributes	Personal Appearance		
	Use of Voice		
	Tact		
	Courtesy		
	Sympathy		
2. Routine	Neatness of Shop		
	Condition of Equipment		
	Ventilation		
	Accuracy and Promptness of Reports		

While information regarding the above factors is necessary if a fair evaluation of a teacher's standing is to be made, it should be noted from the quotation presented that the ratings given the teachers are based entirely upon the personal opinions of the supervisor and principals.

Unfortunately it is extremely difficult for any person to divorce entirely from his mind nineteen different scoring points while he scores a teacher on the twentieth. Because of this, the rating a teacher receives on "personal attributes" is likely to be influenced by the supervisor's opinion of his "professional attitude" or of his "punctuality."

Added to this difficulty we are faced with the fact that the personal opinion of most humans is likely to be colored by their reactions to the individual being rated on factors entirely outside of the rating sheet. For example, a supervisor may object to a teacher on religious or political grounds, or on account of his lodge affiliations. He may condemn him on the ground that he plays cards during the week or golf on Sunday mornings. These conditions do not make for accuracy in the rating of teachers, and are frequently the cause of considerable injustice and a great deal of dissatisfaction.

While the rating given by the supervisor alone may be lacking in accuracy, it is decidedly more accurate than one based upon the combined opinions of supervisor and principal. The difficulties mentioned appear in the principal's rating as well as in that of the supervisor. In addition to these we have one teacher being rated by a principal who plays golf on Sunday, and another teacher being rated by one who considers Sunday golf one of the major sins. Obviously, the two teachers thus rated cannot be compared in a general scale with any hope of indicating their relative value.

These criticisms have not been made with the idea of minimizing the merit of the Grand Rapids rating sheet. The purpose is rather to emphasize the need for supplementing it with another rating less likely to be influenced by personal opinion. It is believed that the ratings given under the plan developed by the teachers of Grand Rapids will be worth while in any well-organized manual training department in spite of their limitations in regard to accuracy.

In addition to this, however, every supervisor should strive to develop some plan by which he can measure all his teachers with the same measuring stick, and thus be able to support his opinion on the basis of actual measurable evidence. This may be accomplished, to some extent at least, if an effort is made to discover how effectively each teacher has taught the things he has been made definitely responsible for teaching. In order to carry out a plan of this kind, it is necessary that the teacher and the supervisor have a clear and common understanding of what the teacher is to teach. If this condition prevails, the teacher should be willing to submit his class to any test the supervisor presents, provided it comes within the subject-matter agreed upon. When the results of these tests have been received from all teachers the supervisor has a reasonably accurate measurement of the effectiveness of each teacher in "putting over" his subject. It is true this is only one measure of the value of a teacher, but it is an important one, and it is one obtained by measuring all teachers with the same scale.

While there is no thought of questioning the professional honesty of teachers, much will be added to the value of the rating if the tests suggested above are made up in the supervisor's office, and are administered by some individual other than the teacher who is regularly in charge of the class being tested. This can easily be arranged for if, on the days the tests are to be given, teachers exchange classes during the periods used for examination purposes.

Impartiality in checking up the results is just as important as in administering the tests. That this may be secured it is suggested that each teacher be assigned one question which he is expected to grade on all papers from all schools. If this task is too great, two teachers may be made responsible for each question; and, in certain cases where there are enough teachers, even three may be assigned to one question. This will result in greater efficiency and accuracy in grading, and it will relieve the supervisor of the routine of correcting a great mass of papers.

There are many different types of tests being used by teachers in shop subjects and drawing, but seldom do we find the results obtained from a fair and impartial application of such tests being used as a basis for the evaluation of a teacher's ability. The following examples of tests are presented with the idea of setting before teachers and supervisors some types suitable for use in a grading system. It will be noted that no two of them are similar, but each of them tests the students for one or more things.

Test for Skill: Although the primary purpose of the manual arts in public schools is educational, some skill should be acquired by the pupils in the use of the various tools and machines they are called upon to use. The first test has been prepared by the teachers of Grand Rapids for the purpose of discovering the extent to which this skill has been developed. While it is true that the results obtained from the application of such a test indicate only a small part of the progress of a pupil, still it is *a* measure of the effectiveness of a teacher's work.

Practical Test
Grades { 5-2 / 6-1

TEST: Square up a piece of stock to the following dimensions: $8\frac{1}{2}''$ x $2\frac{1}{4}''$ x $\frac{5}{8}''$

Note carefully the following points:

1. Sharpen all planes to be used just previous to giving of test. It is not fair to ask a boy to use dull tools in a test.
2. Use soft stock. Pine preferred.
3. Have a piece of stock of the rough size desired on each bench before the test is started. Have this piece roughed out to correct rough size previous to test week by some boy.
4. Go over carefully with the class before the test is commenced. the operations to be completed so that you are sure they understand exactly what to do first, second, third, etc.
5. Use job sheet for bringing stock to finished dimensions. (See that each boy has a copy of this job sheet before him.)
6. Use hand tools only.
7. Finish this piece to required length using back saw only.
8. After test is started give absolutely no assistance.

Informational Test: The next test was also prepared in Grand Rapids and is designed to cover the information the pupil might be expected to obtain through demonstrations, lectures, or assigned reading.

If a supervisor has in his possession comparative data, from all similar classes in his department, on the amount of information assimilated by the pupils, he has another measure of the effectiveness of the teaching being done in those classes. These results, added to those obtained in the test for skill, should prove most helpful to a supervisor when he is called upon to rate the teachers responsible for obtaining them.

Informational Test
For 7-2 and 8-1 Grades

Name..... School.....
Grade..... Date.....

Note: Fill in correct words in any twenty-five of the following statements.

The lists of statements under I, II, III and IV may be shortened if article is too long.

I: Trees and Lumber

1. A tree which grows in the.....is better suited for lumber than a single tree growing in the ..... because it will grow taller, have a longer ..... and a smaller .....
2. In felling trees they use either an ..... or a .....
3. Less lumber is wasted if they use a .....
4. The best lumber is harvested in the ..... season.
5. Trees which have grown since the forest was cut are called ..... lumber.
6. The growth of the trees take place between ..... and .....
7. The sap wood grows between the ..... and the .....
8. The best wood to use is the.....
9. When lumber is cut so that the annual rings are at right angles to the face of the board it is called.....
10. Knots in wood are the ..... sections of the base of ..... A loose or dead knot in a board indicates that the limb ..... or was ..... off near the trunk and allowed to ..... in the tree.

II: Tools

11. When alternate teeth of a saw are bent on either side of the blade the teeth are called .....; this is done so that the saw will not ..... but cut .....
12. The shape of the teeth on a rip saw are somewhat like a ..... while the teeth of a cross cut saw act on a board somewhat like a series of ..... operating in pairs.
13. The fraction numbers used on gimblet bits are..... The fraction number used on auger bits are.....

III: Operations

14. When getting out stock select the ..... piece possible.
15. When getting out stock examine board for defects such as ..... and .....
16. When I want to cover nails so they will not show I use putty, but before I use putty I take a ..... and force

the head of the nail a little below the surface of the wood.

17. If I were making a nice necktie or glove box I would use on the cover a hingle called a plain ..... or a fancy hinge called a ..... hinge screwed to the outside of the box.

18. If in a certain piece in which screws are needed you cannot conceal them it might improve the appearance if you use .....

19. If I had a hole to bore where I could not turn the ..... all the way around I would use one with a.....on it.

20. When we wish to make a top for a footstool and must use several pieces we fasten them together with ..... There are several kinds; we use .....

21. For a very careful test on a wide piece of stock I would use the ..... square.

22. Circles or arcs of circles should be placed on stock with .....

23. The spoke shave should be used for finishing ..... edges.

24. To bore a hole larger than 1" in diameter use the ..... bit.

25. After a plane iron has been ground it should be ..... on the ..... stone.

26. To remove surplus stock on large curves use the ..... saw.

27. For shaping small irregular curves, use the ..... saw.

28. Steel rods or bars or a piece of pipe should be cut with the ..... saw.

29. To keep a fine chisel point on your marking gauge occasionally touch it with a .....

IV: Finishing

30. Before we are ready to put a finish on we must be sure that the piece has been sand papered until it is absolutely ..... if it is not when a stain is put on ..... spots will form where there are ..... places.

31. If ..... stain is used the grain of the wood will not be raised; if a ..... stain is used the grain will be raised.

32. Sandpaper is made from (a).....(b).....(c).....

33. The grade or coarseness of sandpaper is told by the ..... on the back of the sheet.

34. ..... is the finest we use in the shop and d..... is the coarsest.

35. Sandpaper is sold by the .....

36. There are ..... sheets in a quire.

37. There are ..... quires in a ream.

38. When we have finished using shellac, we should put the brush away in a little .....

39. If I were making a Bird House I would use ..... as a finish.

Test of Understanding: The third test was prepared by a teacher of mechanical drawing in Saginaw, Michigan, and was used to test the student's understanding of what he was doing while making an assembly drawing from a set of detail drawings of a drill-press. The test was given after the pupil had completed the drawing and he was allowed to refer to any notes or reference books he had used while working. No assistance was given by the teacher as the pupil was supposed to have completed the learning period when he turned in his finished drawing.

Drill Press

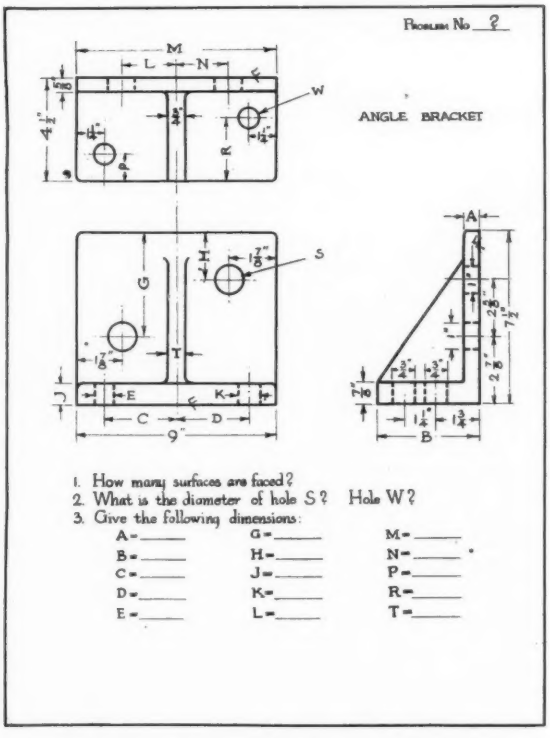
Answer the following questions in your own words, as clearly as possible, and where necessary, show how you get results to problems.

1. What is the purpose of the $\frac{1}{16}$" sawed slot in the side of the bracket and table arm?
2. What is the purpose of the coil spring A?
3. How is the drill spindle driven? How is the speed varied?
4. How is the drive plate fastened to the drive plate shaft?
5. What is the purpose of the 5" Hand Wheel? Where could you find all necessary dimensions for this?
6. Where is the pinion and rack located relative to the bracket?
7. What effect has the Ball race upon the tight and loose pulleys?
8. Which pulley is the tight pulley as shown? If only one were used what mechanism would be used for starting and stopping the drill?
9. What is the object of the No. 2 Bore Fio Morse Taper as specified?
10. What would be the effect of using steel disks instead of leather disks on the "combined speed change and friction drive shaft?"
11. Where would the disks be located relative to the drive plate when the maximum speed of the drill is desired? Where for low speed?
12. If the tight pulley were driven at a speed of 200 ft. per min. how many R. P. M. would the pulley make? If the pulley made 200 R. P. M., find the belt speed allowing three per cent for slippage.
13. What would be the maximum speed in ft. per min. of the drill press spindle when the tight pulley was driven at 150 f.p.m. making no allowance for slippage?
14. Of what material are each of the following parts made: Handwheel, bracket, pulleys, rack, post, base, arm, top spindle bearing, take-up-nuts, pinion, ball races, bushings and washers.
15. How many revolved sections are shown in this drawing? Could these be placed elsewhere, if so, how would their position on the drawing be indicated?
16. Given general reasons for use of each kind of material as is shown on the drawing.
17. How many turns of the handwheel would be necessary to move the spindle from its lowest to its highest position?
18. How much are the pulleys crowned? How else might this be indicated?
19. What particular shape in the design of the bracket gives it excessive strength? Indicate by sketch.
20. How many shoulders are shown on the spindle and what is the diameter of each?
21. Express in feet per minute the minimum speed variation obtainable. Speed of tight pulley equals 200 f.p.m.
22. List places where patternmaker must allow finish.
23. List places where tolerance could be stated for machinist.
24. List different kinds of finish employed in building this machine and state where each was used.
25. What is the taper per ft. on the bottom of the arm?
26. Sketch a quarter section of either pulley showing how it would look if arms were used in place of a web.
27. How much of the bracket is shown in cross-section? Why?
28. Give the following center to center distances: Spindle to post, table to post, bracket clamping screws. What is the total swing of the table and bracket?
29. How is the post fitted and held rigid to the base?
30. Compare the advantages and disadvantages of this drawing as used in the shop to a set of detail drawings.
31. For which parts would patterns have to be made to build this?
32. Where are fillets needed in building patterns for this machine?

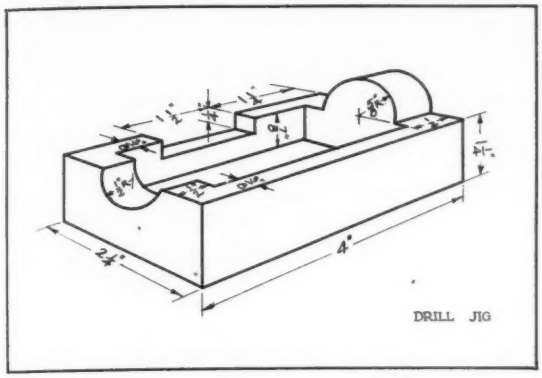
Test of ability to use blue prints or drawings: The fourth test is one which has to do with the measuring of the ability the pupils have acquired in the reading of blueprints. If the pupils are in a drawing class their progress can be partially measured by a test which indicates the extent to which they can make use of the drawings they made. If the pupils are from the shop the success of much of their work depends on their ability to read blueprints. If they have not learned to do so elsewhere, the shop teacher must see to it that they are taught.

In either case such a test will measure progress, and any list of grades by classes should help the supervisor determine the relative effectiveness of his teachers.

This test may be in one of two forms. First, the blueprint may be of some project with which the pupils


Problem No 2
ANGLE BRACKET
1. How many surfaces are faced?
2. What is the diameter of hole S? Hole W?
3. Give the following dimensions:
A=_____ G=_____ M=_____
B=_____ H=_____ N=_____
C=_____ J=_____ P=_____
D=_____ K=_____ R=_____
E=_____ L=_____ T=_____

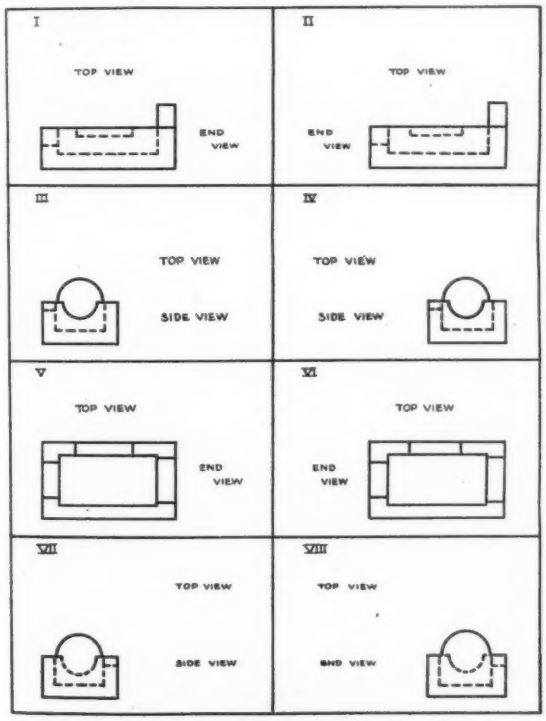
A DRAWING FOR TESTING STUDENTS' ABILITY TO READ BLUE PRINTS.



A DRAWING TO TEST ABILITY IN ORTHOGRAPHIC PROJECTION.

are familiar, and the questions designed to discover if they can make out a bill of material for it. Second, the blue print may be of the type shown with questions which test the pupils' ability to find certain dimensions.

Test of ability to represent an object orthographically: The last type of test to be considered—although it does not by any means exhaust the possibilities—has for its purpose, the testing of the ability of students to



AN INTRODUCTORY TEST FOR ORTHOGRAPHIC PROJECTION.

represent an object by means of orthographic projection. This test may be used in a drawing class or in a shop sketching class.

The test is easily administered and need not consume more than ten minutes of a period. It is suggested that it be used once a week in those cases where the class meets five days a week, and once a month in those cases where the class meets not more than twice a week.

It is customary in using a test of this type for the class to count off in fours, sixes, or eights, according to the number of views shown in the problem sheet, and each student is then assigned the view corresponding to his number. By this means the whole class is working on one object although no two adjacent pupils are drawing exactly the same views in the same order.

Here again the relative standing of each class may be determined quite accurately as no attempt is made to grade the technic of the work. The whole question is, can the students put on paper the views called for of an object in the order in which they belong?

This test provides another measure of the efficiency of the teaching, and such a measure should be invaluable to a supervisor who is responsible for making recommendations regarding the status of the members of his teaching force.

It should be understood that the author has no thought of a supervisor using all or any of these tests. However, the point should be made quite strongly that he should use some type of test or tests, in order to determine with reasonable accuracy, the relative teaching ability of his teachers. The measure of efficiency would then be taken into consideration along with the teacher's personality, attitude and cooperation, and a more equitable comparison be made. By this means the weakness of a grading system based entirely upon the opinion of a supervisor or principal will be partially overcome.

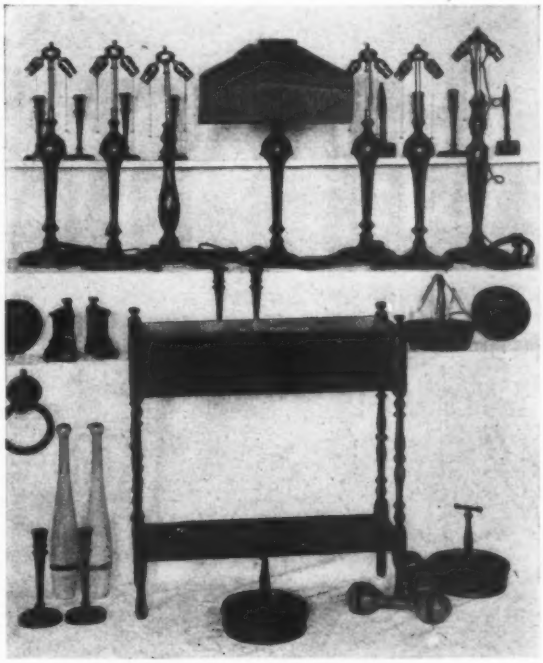


EXHIBIT OF MANUAL TRAINING DEPARTMENT AT ABERDEEN, S. DAK.
H. P. GERBER, Instructor.

The Stockton Prevocational School, Stockton, Calif.

F. R. Love, Stockton, Calif.

THE Stockton Prevocational School is the only one of its kind in the state of California. It is organized similar to Smith-Hughes work, but does not serve the same purpose. The students spend half their time at work and half at study. There is some correlation between the shops and the studies, but not so much as in a vocational program. Boys are taken into this school in the sixth grade and upon graduation are admitted to the high school. About fifty per cent of the boys go to work after graduation. The major part of them are over-age for their grades, so are allowed to enter part-time school and go to work when they have finished their eighth grade course.

When a boy enters the school, he is placed in the shop where there is room to accommodate him. During the first two years he is rotated through all the shops, and the last year is allowed to choose the one in which he wishes to work. There are only three shops, but each shop offers a variety of work. The machine shop has some electrical, some automotive work, some forging and machine shop work. The woodshop has bench and machine work, wood finishing with both hand and spray, and a little carpentry. The sheet metal shop has some special work in drafting and printing, besides work on sheet metal machines.

Each shop has some kind of work that is done on the production basis. This makes it possible to expose a boy to a real industrial condition and helps the teacher to determine whether a boy has properly chosen the work in which he wishes to specialize. Some boys succeed fairly well on project work, but when put under a little pressure on production they fail.

1. SECTION OF MACHINE SHOP; 2. ANOTHER SECTION OF THE MACHINE SHOP; 3. SHEET METAL SHOP; 4. SECTION OF THE MACHINE SHOP; 5. WOOD SHOP; 6. FINISHING ROOM.

Students are recruited for this school from all the other graded schools in the city. Each principal sends boys there, who in his estimation, can best fit into our training program. Boys who do not have average intelligence are not admitted. They are sent to the special classes which take care of this type of student.

Even though boys put in half of their time at work, they get as much time for the so-called essentials, as they do in the regular grammar schools of the city. A comparison of time schedules may be of interest to those who think of starting this kind of work.

The time schedule in spelling offers 145 minutes per week in the sixth grade, 220 minutes in the seventh grade, and 200 minutes in the eighth grade; in grammar and composition, it offers 275 minutes in the sixth grade, and 270 minutes in the seventh and eighth grades; in penmanship, it offers 70 minutes in the sixth grade, and 70 minutes each in the seventh and eighth grades; in reading and literature it offers 255 minutes in the sixth, seventh and eighth grades respectively; in health, it offers 65 minutes in each of the three grades; in history, it offers 170 minutes in the sixth, seventh and eighth grades respectively; in geography, it offers 260 minutes in the sixth grade, 240 minutes in the seventh grade, and 185 minutes in the eighth grade; in civics, 100 minutes per week are offered in the seventh grade and 130 minutes in the eighth grade, and in arithmetic, 400 minutes per week are offered in each of the three grades.

Besides the regular study time, special emphasis is given in some of the subjects during the shop period. Arithmetic is given special consideration in all the shops and put to practical use wherever possible.

All the studies are arranged on a departmental basis. Subjects that are closely related are taught by one teacher, so that the necessary carry over can be made. The school has a regular grammar school principal who works under the direction of the supervisor of vocational education. The principal and the supervisor have regular meetings with the teachers and all organization work is done on a group basis.

The school has been in operation for the last ten years. During all this time a close check has been kept on the boys who enter high school. In every instance we find graduates from this school succeeding as well as the average graduate from the regular grammar school.

When a boy does not go to high school, the shop instructors make every effort to get him employment in the work he is best fitted to do. This aids greatly in stimulating interest in the work, for a boy will make a much greater effort to do good work if he feels the teacher has this personal interest in him. Every effort is made to get the boys to continue their school work, but many are forced through financial reasons to go to work.

The greatest service a teacher can render a student is to know him at home, as well as at school, and thus be able to intelligently guide him into that place in life which needs his services most, and at which he will find the greatest happiness.

Automotive Training in the High Schools

Paul F. Schenck, Roosevelt High School, Dayton, Ohio

THE automotive industry has had a growth second to none. This wonderful industry which today uses 53 per cent of the world's production of glass, 65 per cent of the rubber produced, huge quantities of steel, and many other items too numerous to mention, was founded by five great pioneers, Haynes, Ford, Olds, Duryea, and Apperson, men whose cars still occupy an enviable position. In 1895, there were four automobiles registered in the United States; in 1909, this number was increased to slightly more than 300,000, and in 1924, which is the latest report available, there were more than 17,500,000 motor vehicles owned and operated in the United States. Another fact is that eleven out of every thirteen cars in the world are owned and operated in the United States. These facts together with the wonderful educational value of the subject, make necessary the establishment of classes in automotive training in all of the better high schools.

Automotive training is a most extensive subject because it covers such a large, modern, and important field. The methods used in instruction must be on the basis which the subject deserves. This article is written primarily to discuss a course of study and methods for its use in high schools, and must therefore be based on the educational value of the subject. Automotive training has a most important place in the trade schools too, but there it must be treated from an entirely different angle. These trade school boys are going to make their living in the automobile business and must be equipped for that particular purpose. The aims in the high schools must, however, be based on the educational value of the subject rather than on its vocational value. Because of this fact automotive training in the high schools can, and must be treated in an entirely different manner, and should and must be along broader and more scientific lines.

The student must not only learn the theory and principles by which automobiles work, but he must also have an understanding of the mechanical work involved in the manufacturing processes, electrical phenomena, chemistry, mathematics, and many other things. It is not supposed that every student will enter the repair business or any other phase of the automobile business, but because of the important part the automobile plays in our everyday life and its great educational value, this course will be a great asset to him. The student must be taught the theory and principles by which automobiles work so that he will understand the how and why of automobiles, and how to do some repair work. Special

attention must be given to the scientific facts involved, the composition of the various materials and how the various parts are manufactured. Discussions must be held on related subjects and sciences. Mathematical problems must be worked out and understood. Power must be calculated and electrical problems must be demonstrated. Many pieces of equipment such as are used in the general science laboratory, the chemical laboratory, and the physics laboratory, can be used with very good results and should be used wherever possible. The one big question must be the "why" of things, which will make possible an understanding of the basic principles involved and will greatly increase the ability of the student to think. This course of all courses appeals to the high school boys of all classes, because it opens an avenue of opportunities to them to express their native instincts. It is a two-year course and is open to ninth and tenth-year boys. However, the eleventh and twelfth-year boys are finding it a very desirable subject and it is not at all embarrassing to them to be in classes associated with younger boys which is not the case in some other subjects.

The methods used are very important. The students are first taught the location and function of the various units so that they have a general conception of the car. These units are then divided into their component parts, so that each part can be studied in great detail and in relation to the other parts. The material and manufacturing methods must be studied. Jobs should be done in the shop, which will supplement the work as taught in the classroom. The students are guided in their shop work by a laboratory manual composed of jobs. They perform the job as instructed by the manual, and then write their results and observations, which are corrected and O. K.'d by the instructor. Motors are repaired and run. Horsepower tests and efficiency tests are made. The first-year students are given the theory and principles of operation and mechanical problems. The shop work consists of routine and some experimental jobs, together with instructions on the proper use of tools.

The second-year students are given special instruction along the line of carburetors and electrical work. They do actual repair jobs on automobiles and run some tests along research lines. They also pay special attention to shop mathematics. As an added problem each student is required to give a talk on some related subject which is assigned. The student outlines his talk and turns the outline in one week before he gives the talk. After the talk he leads the discussion on the subject, which is entered into by each member of the class. The subjects assigned for talks are such as, "The History of the Automotive Industry," "The Relation of the Automotive Industry to Other Industries," "Roads," "Glass," "Steel," and many other subjects of like nature. These talks link up the automotive department with the academic departments, give the student a wonderful opportunity to get up and talk about a subject on which he has made careful preparation and which he knows more about than any other member of the class. In the following discussion he again has the opportunity to show that he knows more about it than the rest. In order for him to get this feeling, he must carefully prepare his material and to do that he must spend some time in digging up this material.

This plan has worked with a great deal of success in our department. The boys must be given the idea early in the term that automotive training is not just a snap subject and that it really means some thought and effort for them to master it. With the natural attractiveness of the work, and the interest of the boys in all things pertaining to the automobile, together with a carefully planned and thought out course of study, automotive training offers a real opportunity for high school boys as a practical and educational subject such as is not found in other subjects. An outline of the course of study as used in this department follows. The purpose of the outline is to show how and when we take up the various units in their different phases:

I. **General Survey of Chassis Construction**
  - A. Location and functions of various units.
    1. Relation to each other.
    2. How held in place.
    3. Materials used and why.
  - B. Frame.
    1. Materials used and why.
    2. Design.
    3. Methods of manufacture.
  - C. Springs.
    1. Duties and how performed.
    2. Various types.
    3. Design.
    4. Materials used.
    5. Manufacturing methods.
    6. Care.
    7. Installation.
  - D. Front axles and steering gears.
    1. Axle construction.
       - a. I beam.
       - b. Tubular.
       - c. Materials used.
       - d. Methods of straightening.
    2. Steering gears and types.
       - a. Planetary.
       - b. Worm and gear.
       - c. Worm and sector.
       - d. Cam and lever.
    3. How the car is guided.
    4. How the front wheels are made to turn at the same time, and always maintain a definite relationship.
    5. Camber.
    6. Toe-in.
    7. Castering effect.
    8. Bushings.
       - a. Why necessary.
       - b. Materials.
       - c. Installation.
  - E. Rear Axles.
    1. Why differential is necessary.
    2. How it works.
    3. Types.
       - a. Plain live axle.
       - b. Semi-floating.
       - c. Three-quarter floating.
       - d. Full floating.
    4. Types of gears.
    5. Gear ratios.
    6. Bearings.
    7. Troubles.
    8. Adjustments.
    9. Other repairs.
    10. Lubrication.
  - F. Change Speed Gear Set.
    1. Why necessary.
    2. Leverage.
    3. Gear ratios.
    4. Operation.
       - a. Standard shift.
       - b. Other shifts.
       - c. Position of the gears.
         1. When car is reversed.
         2. In neutral.

5. Lubrication.
   a. Kind of lubricants.
   b. Amount necessary.
6. Adjustments.
7. Other repairs.

G. Universal Joints.
1. Why necessary.
2. Constructions.
3. Materials.
4. Types.
5. Repairs.
6. Lubrication.

II. Power Plant.

A. Motor.
1. Theory and operation of four cycle principle.
2. Cylinder constructions.
   a. Materials used.
   b. Manufacturing methods.
   c. Removable head.
   d. Cast enbloc.
   e. Valve locations.
3. Valves.
   a. Materials used.
   b. Angle of face.
   c. Re-facing.
   d. Grinding.
   e. Adjustments.
   f. Timing.
4. Pistons.
   a. Function.
   b. Operation.
   c. Materials used and why.
   d. Design.
   e. Weight.
   f. Mechanical balance.
   g. Clearance allowed.
5. Piston rings.
   a. Function.
   b. Operation.
   c. Types.
   d. Materials used.
   e. Manufacturing methods.
   f. Installation.
   g. Oil regulation.
6. Piston pins.
   a. Function.
   b. Material.
   c. Methods of pin retention.
   d. Bushings.
   e. Clearance.
   f. Installation.
7. Connecting rods.
   a. Function
   b. Design.
   c. Materials.
   d. Weight.
8. Crankshaft.
   a. Design.
   b. Materials.
   c. Accuracy.
   d. Counter balanced.
   e. Size.
9. Bearings.
   a. Connecting rod.
   b. Main.
   c. Size.
   d. Materials.
   e. Installation.
   f. Lubrication.
   g. Troubles.

B. Cooling Systems.
1. Water.
   a. Types.
   b. Types of radiators.
   c. Types of pumps.
   d. Hose connection troubles.
   e. Other troubles.
   f. Anti-freezing solutions.
2. Air.
   a. How air is conducted.
   b. Cooling fans.
   c. Air fans.
   d. Efficiency.

C. Lubrication systems.
1. Oils.
2. Splash.
3. Force feed.
   a. Pumps.
   b. Troubles.
   c. Methods.
4. Changing oil.
5. Crank case dilution.
6. Oil filters.

D. Carburetion Systems.
1. Function.
2. Methods.
3. Proper mixtures.
4. Types used.
5. Troubles and repairs.

E. Oils and Fuels.
1. Source of supply.
2. Methods of obtaining.
3. Methods of refining.
4. Characteristics.
5. Types of fuels.
6. Meaning of boiling points.
7. Lubricating oils.
   a. Why source is important.
   b. Viscosity.
   c. Flash and fire tests.
   d. Cold tests.
   e. Proper grades.
   f. Blended oils.
   g. Straight distilled.
   h. Cleaning by filtration.
8. Substitutes for gasoline.

F. Electrical Units.
1. Wiring diagrams.
2. Location of the various units and their functions.
3. Principles of magnetism.
   a. Lines of force.
   b. Polarity.
   c. Permanent magnet.
   d. Electro magnet.
   e. Strength.
4. Electrical measurements.
   a. Volt.
   b. Amperes.
   c. Ohms.
   d. Watts.
   e. Problems and calculations.
5. Typical battery ignition systems.
   a. Induction coils.
   b. Timers.
   c. Breaker points and adjustments.
   d. Condensers.
   e. Distributors.
   f. Timing.
   g. Advance and retard of spark control.
   h. Troubles and repairs.
6. Magneto ignition system.
   a. Construction.
   b. High tension.
   c. Low tension.
   d. Troubles and repairs.
7. Starters.
   a. Principles of operation.
   b. Construction.
      1. Armature.
      2. Field coils.
      3. Brushes.
      4. Frame.
      5. Wiring.
      6. Windings.
      7. Single unit systems.
   c. Torque.
   d. Efficiency and power output.
   e. Current required for operation.
   f. Tests.
   g. Troubles and repairs.
8. Generators.
   a. Principles of operation.
   b. Construction.
      1. Armature.
      2. Commutator.
      3. Frame.
      4. Field coils.
      5. Brushes and brush arrangements.
      6. Windings.
      7. Wiring.
      8. Bearings.
   c. Efficiency and maximum output.
   d. Regulation of output.
      1. Third brush.
      2. Thermostat.
      3. Bucking coil.
      4. Vibrating relay.
      5. Constant voltage.
      6. Cam type regulation.
   e. Tests.
      1. Armature.
      2. Ground in field coils.
      3. Grounded brush holder.
      4. Worn brushes.
      5. Worn commutator.
      6. High mica.
      7. Worn bearings.
   f. Repairs.
      1. Rewinding field and armature coils.
      2. Truing up commutator.
      3. Undercutting mica.
      4. Repairing grounded brush holder.
      5. Replacing brushes.
      6. Replacing bearings.
      7. Adjusting charging rates and discussion of proper rates.
9. Storage batteries.
   a. Definition.
   b. Construction.
   c. Materials.
      1. Plates.
      2. Separators.
      3. Jars.
      4. Boxes.
      5. Sealing compound.
      6. Other parts.
   d. Manufacturing methods and inspection methods.
      1. Grids.
      2. Plates.
      3. Separators.
      4. Jars.
      5. Jars.
      6. Sealing compounds.
      7. Other lead parts.
      8. Assembly.
      9. Forming charges.
      10. Capacity tests.
   e. Electrolyte.
      1. Source.
      2. Composition.
      3. Specific gravity.
      4. Care in handling.
   f. Recharging.
      1. Kind of current required.
      2. Charging rates.
      3. Hydrometer tests.
      4. Voltage tests.
      5. Cadmium tests.
      6. High rate discharge tests.
   g. Troubles
      1. Leaky jars.
      2. Corrosion at terminals.
      3. Bad separators.
      4. Buckled plates.
      5. Sediment in bottom of jars.
      6. Low capacity.
   h. Repairs.
      1. Installing new jars.
      2. Sealing leaky posts and covers.
      3. Opening battery.
      4. Installing new separators.
      5. Lead burning.
      6. Assembly of batteries.
      7. Precautions to take against injury.
      8. What to do in case of injury.
      9. Freezing points.
      10. Discussions of battery troubles and chemical problems.
10. Lighting systems.
   a. Wiring diagrams.
   b. Wiring systems.
   c. Types of wire and their uses.
   d. Switches.
   e. Fuses.
   f. Size of bulbs.
   g. Reflectors.
   h. Focusing.
   i. Lenses.
   j. Lighting laws.
11. Other electrical units.
   a. Horns and their adjustments.
   b. Spot lights.
   c. Signal lights.
   d. Troubles.
   e. Repairs.
12. Trouble shooting with volt meters, buzzers, etc.

III. **Problems and Calculations.**
- A. Force.
- B. Work.
  1. Meaning of foot pounds.
  2. Calculations.
  3. Problems.
- C. Energy.
  1. Energy is the ability to do work.
  2. Storage.
  3. Calculations.
  4. Problems.
  5. Transformation of energy.
- D. Power.
  1. Definition.
  2. Kinds.
  3. How obtained.
- E. Rating of Power.
  1. Horsepower.
     a. Definition.
     b. Formulas.
        1. Steam engines.
        2. Gasoline engines.
        3. Electrical.
     c. Calculations.
     d. Problems.
- F. Power units.
  1. 33,000 foot pounds of work.
  2. Watts.
  3. 746 watts equals one electrical horsepower.
  4. Kilowatt (K. W.).
     a. 1,000 watts.
- G. Motor efficiency tests and curves.
  1. Making and using graphs.
  2. Advantages of graphs.
  3. Problems.

IV. **Textbooks.**
- A. The Modern Gasoline Automobile by Page.
- B. Automotive Trade Training by Kuns.
- C. Automotive Repair, Wright.

These books are used by all the students. A very complete reference library is maintained in connection. All the students in the department have easy access to these books and are urged to use them. The shop work is taken up along the same lines as is taught in the classroom, and the students are guided in their shop work by a shop manual composed of jobs.

V. **Time Required.**
- A. Time required is two periods per day and five days per week.
- B. Four periods per week are spent in the classroom.
- C. Six periods a week are spent in the shops.

Architectural Drawing for Secondary Schools

Towne R. Abercrombie, Ironwood, Mich.

THE question of establishing a course in architectural drawing, that justifies the placing of the subject in the secondary school curriculum, should receive more attention than it has in the past. The writer has been interested in this subject as it is taught in a great many schools and, from the observation and correspondence regarding the subject matter and methods of teaching, has come to the conclusion that many drawing teachers are presenting a course which does not embody the real principles of the subject, so far as secondary school scope is concerned.

We find that some base their conception of a course on the "orders." Still others base it on rendering, and others on perspective and various other phases of the subject. All of these are an integral part of the subject, yet they cannot receive the proper treatment in the secondary schools.

The method which probably deserves the strictest condemnation, and one which we find more frequently than others, is the "copy" system under which the student is given a set of plans, consisting of floor plans, elevations and details, and is instructed to copy them at a given scale, or line for line. Upon the completion of this copy, he is given a grade for an architectural drawing course. The fact is that in all probability he would hardly be able to define the word architecture. He has no more completed a course in this subject than has the student of English who copies verbatim Longfellow's "Evangeline," signs his own name, and then presents it as a model of his ability. How often we find, however, bona-fide copies of model homes, designed by prominent architects, appearing over students' names as designers.

Is this fair to the student? Is it fair to ourselves, as instructors, and is it fair to the course itself which should naturally justify itself in our schools and can be presented in such a way as to make it a practical, well worth-while subject? Does copying secure any definite results? Can we teach design by this method?

I am reminded of an article which appeared some years ago in THE INDUSTRIAL ARTS MAGAZINE, regarding a noted artist who visited the school where, as a student, he had received his first knowledge in the craft in which he has now reached distinction.

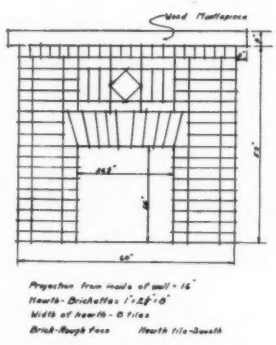
As he passed through the studies where his early efforts were made, he was much interested in some sketches made by the students of his time and was carried back in memory to those carefree, confident days with his classmates. "Yes!" said he, "Charley thought he designed that one, George thought he designed that, and here is one I thought I designed."

"But! Did you not design it?" was asked.

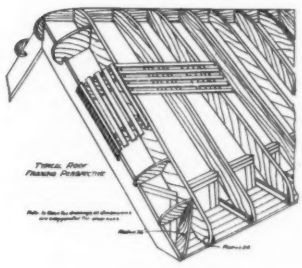
"Design it? Of course not," was the reply. "I only assembled it under the guidance of the teacher."

Are our architectural drawing courses based on somewhat the same methods? Will some of our pupils some day make like remarks regarding our methods? Will we have an exhibit of scores of plans, sections, elevations, columns and what not, appearing over students' names, but not a single application of pure design as applied by the student himself. I do believe in a copy plate as the first problem in a course, in order to acquaint the student with balance, proportion, and general aspect of a completed drawing, but I cannot conceive of any benefit derived by students copying an entire course and claiming it as their own product, when in fact it is the work of others. It is tearing down the principles we are attempting to inculcate in this, and other phases of our school work. It is a detriment rather than a benefit to the pupil. We should, instead, endeavor to teach originality, initiative, and appreciation of design, rather than offer a course that allows for none of the principles but rather prohibits their incorporation.

A second system of teaching architectural drawing that should be condemned is teaching, or rather, presenting for copy, the aesthetics of architecture or the historic orders of architecture. To fully comprehend

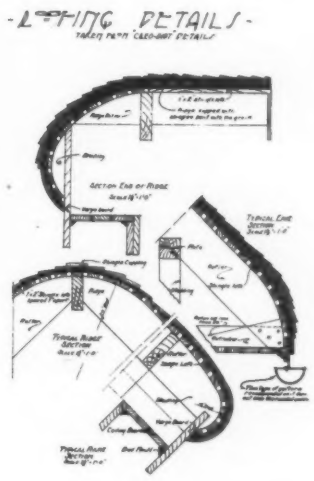

Wood Mantelpiece
Projection from inside of wall - 16"
Hearth - Brickettes 1'-2½"-0"
Width of hearth - 8 tiles
Brick - Rough Face
Hearth tile - Smooth

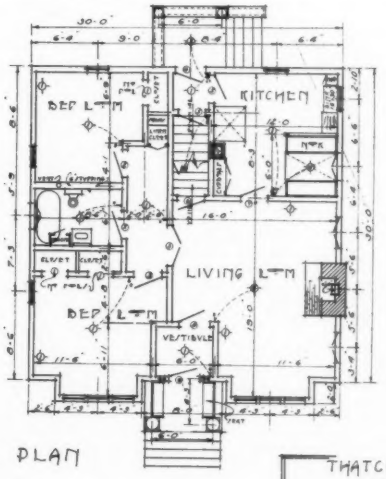
FIREPLACE DETAIL
TAKEN FROM ALLIANCE BRICK Co. PLAN



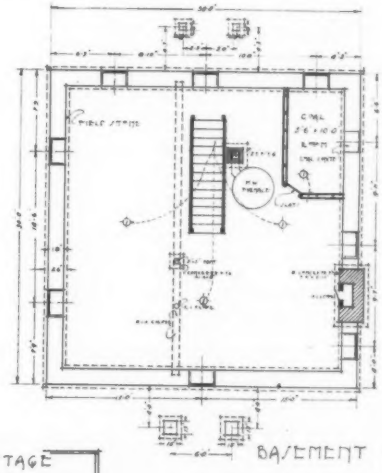
Door Schedule

No.	Size	Note door, just opening





FLOOR PLAN



BASEMENT PLAN

THATCHED COTTAGE
GEO. N. SLEIGHT
DESIGNED BY KENNEDY & McBAIN

THREE DRAWINGS OF A SET OF FIVE PLATES DRAWN IN THE AUTHOR'S CLASSES.

the meaning of the orders, it becomes necessary for us to delve deeply into the history of architecture. Our secondary school course does not allow for this, and our pupil does not have the capability of grasping the subject matter enough to understand and appreciate it. Why should we assume, therefore, that we are offering a course in the fundamentals of agricultural drawing, if students do not understand what they are doing? In all probability they could, under a master's guidance, assemble the lines of the 47th problem of Euclid, but the underlying principles would be no more clear than the principles of the architectural orders. Can we teach the principles of design by copying drawings of Vignola's Composite Order or Vignola's Denticular Doric? I believe we cannot.

We might compare the student of this type with a student who contemplates entering the medical profession. We are aware that our secondary school does not offer a wide variety of matter dealing directly with the medical field, yet we do have subject matter which the boys should become acquainted with as it contains some fundamentals of the medical course. We do not hear of a secondary school that offers a course in surgery, and uses the methods of some of our famous surgeons as patterns for this course. Decidedly not, yet in such a course as we offer in our own subject, we attempt to go into a subject which, to our students, is as complicated and intricate as surgery to the prospective medical man.

We should consider that, if the pupil is to continue his studies in order to master the vast fund of knowledge required of a member of this profession, he would, in due time, and in institutions of learning designed for that purpose, receive training which would fit him for going forth and practicing his profession. We can also assume that pupils who expect to become architects will, at a future date, receive the required knowledge in its proper place, namely, in a college of architectural engineering.

These requirements would consist of an understanding of the calculations required to determine the size and strength of the steel and timber members used in construction, a knowledge of design, beams, columns, footings, etc., as related to re-inforced concrete construction, a knowledge of building materials, methods and specifications, architectural history, architectural design, and a host of other requirements. These, it can readily be seen, cannot be taught successfully in secondary schools, except to a very limited extent.

I have had students make copies of Vignola's Doric Order, of the Cyma Recta, Cavetto, Ovalo, Cyma Reversa, and Scotia columns. Upon completion they were masterpieces of reproduction, for secondary school pupils, and objects of attention and comment upon exhibit day. This copy did give the pupil an outlet for his artistic ability and brought forth every atom of accurate, careful workmanship which he possessed. However, as a fundamental of architectural drawing it was meaningless.

The third method, or methods, of teaching the subject, or portions of it, are the methods in which rendering, perspective, etc., are used as a basis for an architectural course. I admit that they are an integral part of the subject and necessary to the practicing architect. It is a mistake, however, to use any of these phases as a base for an entire course.

From these criticisms, please note that I say "our" methods, for I too am guilty of some of these wrongs; some may expect that I am about to offer an antidote in the form of a model course for all architectural drawing courses. I do not, however, nor would I deem it advisable to attempt standardization of this subject, or methods of teaching it. Munro well says that "teaching is an intensely personal thing. It ought not to be standardized, indeed it cannot be. Nothing can be more fatal to the success of a teacher than an injunction to use some one method to the exclusion of all others."

No two communities are alike in the individual students, in the time allowed for the teaching of the subject, or in the equipment available. We find a vast difference in the ideals of our pupils. There are decided individual differences in capacities and aptitudes among them. It may be that we will find it necessary to offer some of these various phases of the drawing course, to the exclusion of all others, in order to satisfy public demand. It is not necessary, however, that we teach one or more of these phases and still maintain to ourselves, and to our pupils, that we are offering a fundamental course in architectural drawing. In presenting a course, or rather a basis for a course which I believe is practical, it was first necessary that this course be given a fair trial to prove its merits. The method that is based on the principles which justify the testing of the subject in our schools, should be practical and usable. After several years of experience in teaching secondary school pupils this subject, I have found that it can be presented so that it is practical, educational, and a tangible asset to the pupil, regardless of whether he anticipates following the architectural profession or not.

My conception of a course for secondary schools that meets the needs, and justifies itself in the school curriculum, is a course that will teach a boy the various principles of architectural drawing as applied to simple, domestic buildings. By this I do not mean simply making a set of drawings. The drawing itself is of small importance; the knowledge of the principles involved in the making are most valuable and usable.

The years of experience and experimentation have taught me that there are certain things that we should endeavor to accomplish in the duration of a course. These we may call the specific aims or objectives and I shall take them up briefly and explain why I think they are necessary.

I. *To give Vocational training as fully as time and equipment will allow.* In order to give vocational training, or train a student for regular employment, it

becomes necessary that our course be based simply on *fundamentals.* "Vocational education," it has been well said, "should so equip the individual that he is able to earn a livelihood for himself, and, as far as possible, to find in the vocation his own best development. The extent to which we should offer vocational training depends upon our facilities and the facilities that the pupil may have to obtain further training later."

Should he desire architectural drafting as a profession, and expect to secure a basis for his future work in our secondary schools, are we assisting him to any great extent by allowing him to copy the Doric Orders? Instead we should do our utmost to make the course as near commercial as possible, as far as our time and equipment will allow. The one element which should supersede all others, regardless of time, equipment, etc., is fundamentals.

II. *To develop personal traits of patience, perseverance, industry and integrity.* We have here an aim which should be emphasized to the fullest possible extent. In order to develop these traits of patience, and industry, it is necessary that other factors than the subject matter at hand, be incorporated into our work. In all probability the student will not be aware that we are gradually instilling these principles, yet if our work is so organized and conducted that it is based on proper principles, we cannot help but impress these traits. These traits will remain with the pupils long after the course is forgotten. I do not feel, however, that these principles can be taught if our subject matter is scattered and presented in a hap-hazard fashion.

III. *To provide opportunity for development of the creative instinct and originality and initiative in selection, design and execution.* Perhaps I have discussed this at sufficient length heretofore but I do wish to stress the portion providing for "development of creative instinct and originality." Surely there is no opportunity for this with copy work or with the aesthetics of architecture.

IV. *Development of habits of neatness, accuracy and thoroughness.* No course of shop or classroom work is justified unless it does teach these principles. The boy or girl who contemplates entering any of the phases of industry or home life is not treated fairly if these primary principles are not instilled in our schools.

V. *To encourage a just pride in personal achievement and,* VI. *To develop a sense of appreciation of good workmanship* constitute aims or objectives which should be incorporated in our courses. The last two of these aims are self-explanatory. These principles could not be instilled if our courses would not allow for personal achievement and develop the sense of appreciation of good workmanship, incorporated in this achievement.

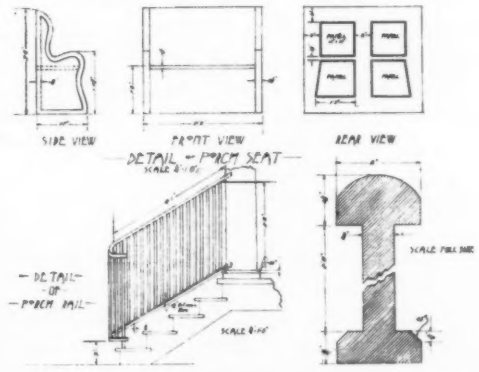
No doubt many instructors could add more upon which to lay especial stress. However, if we do use these objectives and secure definite results, we have taught our subject so that it is justified.

In my own course I attempt to follow commercial routine as closely as possible. Especial stress is laid on the fundamental principles of architecture and the "why" of each line or curve drawn. What does it represent? Is this representation a necessity? These students upon completion of the course have as thorough a knowledge of principles of design as applied to domestic buildings as it is possible to give them. In addition to this they also thoroughly understand the principles of construction. Our first work in the course is a copy plate. As I mentioned previously, I do approve of this for a first plate, for this reason that it teaches balance and general aspect of a completed plate.

From this point on a course is given that is definitely related, step by step, to the design and construction of a home. Starting with the procedure required in planning a home, the preliminary sketches, the relations between prospective builder, architect and contractor, we go on through the various steps. Excavation, including units of measure, and type of soil, are considered as the basement plan progresses. With this we also estimate the cost of construction, using current prices of materials and local wage scales.

From this point we take up the various floor plans, elevations, sections and details, giving every point due consideration. Orientation, framing construction, and building codes, receive their share of attention. This method is carried through to the completion steps in a home. Our completed project consists of a set of plans, elevations and details. The accompanying illustrations give some idea as to the scope of our work.

Upon completion of this course, there has been a gradual, yet definite progress in the knowledge of the fundamentals, and the students can use their own creative instinct and originality and can execute designs of their own. That this type of course is practical, is assured by the fact that the pupils upon completion, go out into the commercial world and earn their livelihood. This would indicate that the course is based on fundamentals, is practical, usable and an asset to any one pursuing it.



DRAWN IN THE AUTHOR'S CLASSES.
(See Page 125)

Selecting Men for a Trade Education

S. G. Johndroe, Wentworth Institute, Boston, Mass.

(Concluded From March)

Foundry Men's Tests

For the foundry course we may choose a much slower individual both mentally and physically than for the two classes so far dealt with. The physical traits will list about as follows:

1. Fair eyesight.
2. A strong body, not necessarily fast.
3. Ability and liking for indoor work, with little objection to heat, dirt, and gases.
4. Ability to use hands with accuracy and steadiness, not necessarily with speed.

Mental Traits:

1. Reasoning ability concerning things.
2. Ability to follow directions well.
3. Ability to visualize the shape of the thing in three dimensions.

Mental alertness is not a primary essential in this course for the reason that but little machinery is used. On the other hand, in certain periods during the day, alertness would seem to be essential, at any rate to the average observer. The matter of training can be made to take its place quite as well as the alertness itself during the time when the hot metal is being poured. If every man is trained to remain in his station and to do the job assigned him, all will work so smoothly and there will be no accidents.

The question of training in chemistry for these men is important for their quick promotion; and if there is to be a difficult course, the quality of reasoning with ideas or principles will be of considerable moment. The courses in metallurgy and metallography should perhaps be left for the college. They may be attempted by the trade school only if the equipment will permit and then on a very elementary scale. The tests for the physical abilities would be as follows: For No. 1, Lowell Chart; for Nos. 2 and 3, interview; for No. 4, steadiness test.

The kind of steadiness we wish would be such that would remove the pattern without disturbing the mold, the kind that could repair all damage without touching the surrounding parts. The test of fitting a conical brass pencil into different sized holes without touching the sides of the holes until the last possible moment when the pencil fits all around, as given by Link, will show the degree of accuracy and steadiness of applicants. The time is of little importance here. It is the ability to do the job that counts. Speed can be developed by shop training. To find no such steadiness at all would indicate that the applicant had much better take some other course.

For the mental abilities the following will serve as tests: For No. 1, the two years or Stenquist Mechanical Assembly Test; for No. 2, Easy Directions Test; for No. 3, Thurstone's Spacial Relations Test. (This test is not complex and will indicate the presence of a minimum of the trait in question.)

Pattern Makers and Carpenters

The course in pattern making will require a quicker man both mentally and physically than is required for the foundry. The good applicant may be described by the following physical and mental abilities.

1. Fair eyesight.
2. Fairly strong body, well developed chest and arms. Work practically all indoors and at a bench.
3. Preference for indoor work with machines or by hand.
4. Ability to use hands with precision.

Mental Abilities:

1. Ability to reason well about things.
2. Ability to follow directions well.
3. Ability to visualize the thing as actually completed in three dimensions that is described in two.
4. Mental alertness.

Already we have tests for all of the above. In the physical abilities No. 4 is very important. Nos. 3 and 4 of the mental abilities are both quite important.

For the carpentry and building course very little change in the above will be necessary. Our job analysis will give the physical and mental abilities listed below as very desirable.

1. Fair eyesight.
2. Strong and active body. General good health.
3. Ability to work indoors or out in cold or heat.
4. Precision of hand and eye.

Mental Abilities.

1. Ability to reason about things.
2. Ability to follow directions very well.
3. Ability to visualize the thing in three dimensions.
4. Mental alertness.

Again we have tests for the discovery of all of the above but they require a bit different interpretation. Of the physical abilities Nos. 2 and 4 are important. Of the mental abilities, Nos. 2 and 4 are the important ones. For this trade we believe that Kelly's Constructive Ability Test would be an index of the presence of Nos. 1 and 3 of the mental abilities mentioned. We do not believe that the results from the use of the Stenquist Assembly Test would be worth while. The interpretation of the constructive ability test would not be of particular value in selecting carpenters purely, but for selecting possible foremen it might function.

Plumbers and Printers

The course in plumbing will require the following qualities:

Physical:

1. Fair eyesight.
2. Desire for indoor work with the hands; work often dirty and unpleasant and in cramped positions.
3. Strong body, not necessarily active.
4. Ability to use hands accurately.

5. Mechanical ability, not for machines but for assembly.

Mental:

1. Ability to reason about things.
2. Ability to follow directions well.
3. Sense of form. Good memory for form.

The tests used should be the same as previously given. Of the physical qualities, Nos. 2 and 4 are important. Of the mental all are important, but No. 3 is especially important; it will prevent much waste of time and material. The Stenquist Assembly Test and the Form Board become quite important in selecting men for this trade. Mental alertness is not essential. Ability to reason about things may well be left to the Stenquist test in this case wholly. To use any other test would be quite unnecessary. Form memory may be tested by means of the objects in the drawer with the sketches afterward. More time will usually have to be given for the drawing than is given in the case of other classes. Most of the trade knowledge of the plumber is well focused in the fingers and fore arm muscles. They tell him if the solder is right for the wiping and they shape the joint. Of course plumbers are as intelligent as other members of society, often more intelligent, but a man may become a good workman with the tools of his trade without having a high I. Q. If a man has a good memory and can read his blue print, he can get the theoretical part of his trade without going very deeply into either science or mathematics. We are here dealing only with minimum essentials.

The trade school usually has a course in printing requiring from one to two or more years work for reasonable proficiency. Our job analysis will give us the following qualities as very desirable in applicants.

Physical:

1. Good eyesight.
2. Preference for indoor work confining to one of several positions for considerable periods of time.
3. Rhythm.
4. Mechanical ability.

Mental:

1. Ability to reason about things.
2. Ability in English, Grammar and Spelling.
3. Ability to follow directions well.
4. Sense of proportion and distance.

We have tests for Nos. 1, 2, and 4 of the physical abilities and for Nos. 1 and 3 of the mental abilities. It remains to select tests for the others. For No. 3 of the physical abilities, Link uses an apparatus described on pages 116-118 inclusive of his Employment Psychology. Such an apparatus would do very well indeed, but we are to use it on so few men that it would be better to use a small press running at slow speed, asking the applicant to feed in rather heavy and easily handled cards for a minute or two while he is being watched closely. The number of cards fed during the second minute could well be made the score less the number of unsuccessful attempts. The observer would have to stop the press for him at each failure to register a fit. The test could be standardized and interpreted easily after the test had been made a few times.

To test for No. 2 of the mental abilities, we would use the clerical tests given on pages 415 and 421 of Link's Employment Psychology. These would have to be changed from year to year lest they become too well known to the applicants.

For No. 4 of the same we would do well to use a drawing of a cover for a catalog or small booklet requiring a design exactly in the center of the sheet and a line of specified text beginning one inch from the margin and ending at the same distance from the opposite side all to be two inches from the top. The method by which the student goes about this task should be closely observed and will show much. To attempt to standardize such a test would be of little importance. Simply to arrange the tests in order of excellence will be sufficient to rank the applicants in possession of the trait in question. Since we must take a certain portion of all who apply we are not interested as to whether they will become the best printers in the trade but solely in two things. Can they rely upon becoming good printers and can we rely upon their profiting fully by the help which we can give them. If the tests will answer these two questions, we should be satisfied.

Tests for Photo Engravers

Courses in photo-engraving are not common. In some respects the engraver must be an artist. In other respects he can be trained like any other workman. We have had such a course at the Institute for several years. It has been very successful and has turned out many good workmen and a few exceptional men who will soon be at the head of their shops. It has also failed to make anything worth while of a few others who lacked industry for the most part. Perhaps we should go back a bit farther and state what is probably nearer the truth, that we were unable to inspire them with the desire to be industrious, and we had everything in the world we could mention to do it with.

At present we believe that the following mental and physical qualities are essential for the applicant for such a course.

Physical:

1. Very good eyesight.
2. Preference for indoor work, often very warm because of plate dryers, etc.; very intense arc lamps used with cameras; noises bad at times.
3. Very steady hands and arms.
4. Physically active, not necessarily strong.
5. Mechanical ability not marked, some, however, would be quite necessary.

Mental:

1. Ability to reason well about both things and ideas.
2. Potential ability to follow directions very accurately.
3. Ability to remember all directions well.

4. Mental alertness to a marked degree.

For all of the above we have tests. Again we must interpret them with care. We would test for the aesthetic if we could in order that we might develop good camera men but that is beyond us. We feel that they are "not made with hands," or by means of human minds. There is in them that sixth sense of somehow knowing what to do to a plate that will make it produce an image beyond all the beauty that we had a right to expect.

To sum up: We have but few different abilities to test for in a trade school. Not more than ten different tests are necessary and two of these can well be made by the interviewer. There is often no reason, save individual preference, why a given applicant might not succeed in any one of several different trades. The choice often depends upon the presence or absence of a single mental or physical ability. Without this it would seem best for him to choose otherwise. We would like to test for industry, truth, morality, concentration, all of many very general qualities which cannot be measured if we could even find them and isolate them; but we have given it up. We prefer to look for something that can be gotten definitely. Perhaps we can give the applicant some of these things in the course of our work together.

Wild Flower Designs

Article X: The Geometric Basis

Nettie S. Smith, Smith Center, Kans.

A Beautiful Weed. The White-margined Spurge, or Snow-on-the-Mountain is so plentiful in many places as to become a weed, but a valley filled with these hardy plants presents a beautiful sight. Then, when one examines the individual plant carefully, he finds rare and beautiful details. Narrow white margins appear among the lower leaves and grow gradually wider toward the top of the plant where the petal-like leaves surround the cluster of small white flowers reminding one somewhat of another Spurge, the Poinsettia, except that Snow-on-the-Mountain is all green and white. From the center of each flower hangs a rounded capsule of unique shape which holds the maturing seeds.

Avoiding a Photographic Effect. The photograph, Plate 19, gives a good idea of the beautiful forms, arrangements, and values, yet the detail drawings in Plate 20, which were made from the same plant, are more useful for design. So much is shown in the photograph that we are tempted to use too much and thus imitate the photograph. Since the good designer avoids a photographic effect as unsuited to his purpose, let us do so also by using the detail drawings as motifs in developing some of our units. When these are modified, conventionalized, and related to suit the requirements of decoration, there will be no suggestion of a flower photograph.

For a successful design, there must be a conscious plan developed in the mind of the worker, and this plan must not depend upon nature forms. It should express beauty even in abstract shapes. That is why geometric bases are so often used as the foundation of designs to give them character and unity.

Kinds of Geometric Plans. The geometric basis is sometimes very distinct in a finished design, or perhaps it is entirely concealed except to the experienced eye; it is sometimes elaborate like a beautiful trellis with various openings, or it is the simple repetition of a unit at regular intervals on a straight line making a border; the unit is frequently based on some geometric shape as a circle, square, oblong, diamond, or triangle; or an informal unit may be repeated on squared or ruled paper which furnishes the geometric basis. The drawings 4, 5, 6, and 7 are geometric in plan as found in nature, but usually the geometric plan comes from the designer rather than from nature.

The Charm of Primitive Art. The figures and symbols of the primitive weaver were geometric because of the technique of his craft. The weaving necessarily produced straight lines and geometric forms in any pattern introduced, and the worker accepted these limitations as a matter of course and used them frankly. Indian

PLATE 19.

baskets and blankets illustrate this fact. Peruvian textiles are also an excellent example of primitive art and the design student should study their style. One who is privileged to visit the Natural History Museum in New York City will return again and again to the Peruvian exhibit, as the charm of this simple art grows upon him. Batchelder says, "However much of interest there may be in primitive man's pictographs, the value of his design increases as it approaches the geometric. Whatever the motif employed may be, it is the relation of lines and forms that furnishes bones, giving character, strength, vigor to the work."

Dynamic Symmetry. In modern art the Hambridge system, presenting dynamic symmetry, has been hailed

with delight. It is a method of building informal illustrations, as well as formal designs, on a geometric basis, as the Greeks must have done, to gain beautiful proportions. Advanced students will find much of value for design in a study of dynamic symmetry. The following exercises make use of a few of the principles involved.

Basic Folds. A helpful device for establishing a geometric basis is to cut on folds which we shall call "basic folds." Suppose we are to plan a decoration for a rectangular box. A paper the size and shape of the box will be folded two or more times and a few cuts made on these folds or in relation to them. The folds form the basis for a design. There is an infinite number of ways that a thin, rectangular paper can be folded and cut and, if an orderly relationship exists between the folds, as diameters, diagonals, they will be dynamic —giving power and motion to designs based upon them, and the enclosed areas will be symmetrical with measure. These folds produce harmony with opposition of lines, and reciprocal agreement of areas. The designs may be kept very simple, or made more elaborate according to the size of the box, style of decoration desired, and the skill of the worker. If the trial patterns are cut from thin, white paper, unfolded, and laid on black or dark paper under a piece of glass, they will show to very good advantage and the effect can be judged and selections made.

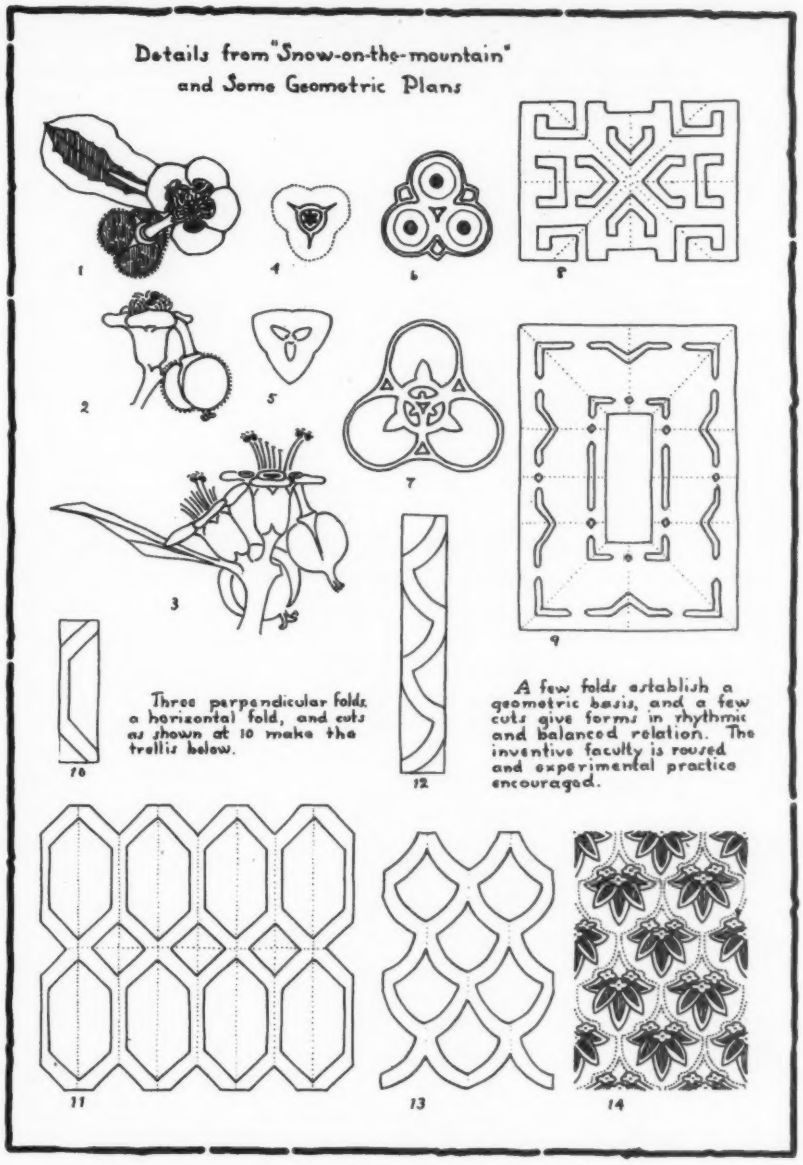

Details from "Snow-on-the-mountain"
and Some Geometric Plans
Three perpendicular folds a horizontal fold, and cuts as shown at 10 make the trellis below.
A few folds establish a geometric basis, and a few cuts give forms in rhythmic and balanced relation. The inventive faculty is roused and experimental practice encouraged.

PLATE 20.

In Plate 20, Figs. 8 and 9, are simple foundations indicate the basic folds. The different spaces may be filled by pleasing abstract forms, or nature forms may be introduced to add interest. The general plan and space division should be good however, before nature details are brought in. The method of working from the whole to the parts is a wise procedure and should become a habit with the design student. Make a general plan, then work out the details last. Number 9 was used about as it is for a Reliefo design on a small box. No. 11 is a trellis-like foundation for an all-over pattern, for which the paper was folded four times and cut as indicated at ten. No. 13 was folded twice and cut as marked at twelve. No. 14 shows one possible development of this foundation by the use of a suggestion taken from the photograph. Some drill in making patterns and designs on basic folds will prove their value and the student will enjoy using the method for practical work.

Happiness Through Industrial Art. One of the most delightful of the crafts practiced today is Gesso or Reliefo work. So many useful and decorative articles can be finished with this medium that it is well worth taking up as an industrial art. Is it not better for us to make suitable gesso frames for prints of the masterpieces than to paint pictures of doubtful value to hang on our walls? With a little skill and at small expense, lovely polychrome frames and placques can be produced, making it possible for all to receive inspiration from the best paintings. An industrial art or craft of some kind makes an excellent hobby—if not a vocation then an avocation. In this way design becomes a vital part of life and happiness.

A Linoleum Design Contest. The Art Alliance of America, of New York City, has announced a linoleum design contest which is open to any registered student of classes in commercial design or industrial art. The purpose of the contest is to secure floor designs of linoleum that will meet the trend in modern decoration, these designs to later become the property of the Armstrong Cork Company. Five prizes ranging from $40 to $300 will be awarded to the successful contestants. The contest closes on May 15th.

INDUSTRIAL-ARTS MAGAZINE

E. J. Lake S. J. Vaughn

Editors

EDUCATION AND SELF-CONTROL

The great problem of all education is self-control. A nation of people who have solved the problem of control over their thoughts, their emotions, and their physical and moral reactions would be a nation of peace, of prosperity, efficiency and happiness.

The extreme emphasis that during the last few years has been placed upon self-expression, freedom of action, and individual initiative, has seemed to undermine both the power and the disposition of the individual to exercise self-control.

The present generation, therefore, finds itself in the midst of a sort of orgy of emotional unrestraint, of nervous disregard of convention or propriety, and of a sort of reckless irresponsibility.

There are a lot of reasons for this. One is the sudden rise to a kind of affluence on account of the increased price of consequent development of that new-rich attitude on the part of a large number of people. Another is the parental abdication in the home. Still another is an unfortunate change of attitude on the part of a great many toward some of the fundamental, time-honored, and sacred institutions and philosophies upon which our civilization rests.

But whatever the reasons may be, such as those mentioned, there still remains a serious defect in our modern education and a heavy responsibility for it to bear. The Editors of this Magazine have been and will continue to be untiring in their efforts to secure opportunity to boys and girls for every reasonable self expression, for any safe and sensible degree of freedom of action, and for every constructive and properly disposed development of individual initiative. But the insistence upon such opportunity must not be construed to mean the placing of approval upon palpable distortions of such desirable qualities or attainments. To argue for self-expression does not argue against the inhibition or even the suppression of evil or undesirable tendencies. To champion a normal freedom of action among students does not condemn all restraints.

Every teacher who promulgates the doctrines of self expression, freedom of action, individual initiative, etc., must understand that there are certain proprieties, certain inheritances, certain laws of human development, and certain social requirements that cannot without tragic danger be ignored or violated.

If in a shop class, the individual is permitted great freedom of self expression in the choice of a task or the design of a project, such freedom must inevitably encounter the principles and laws of design and construction. The test comes in the manner and the spirit of adherence to such laws. Certain proprieties cannot be disregarded. This is the teacher's task. Freedom and self expression must necessarily be modified and abridged by the conditions of the problem, the laws of the undertaking, and the requirements of the school or the social group.

If every student could be made conscious of the fact that every word, every act, and every deed must conform to established law and that it is fatal to ignore or violate such law—that freedom itself in the highest sense is achieved only through obedience to law, a much higher type of self control would be easily developed.

The man who cannot control his thought, his emotions, his temper, and his acts is a weak and pitiful spectacle. Under the present conditions the development of such control is up to the school teacher.

There is every conceivable condition in the modern world of work to disturb the nerves, shake the confidence, and render the individual unfit for service. Only the individual who learns the important lesson of self-control under varying and disturbing circumstances is able to cope with the requirements of modern business, industrial, and professional life.

Self-control is not an inherited characteristic—it is acquired. It can be acquired by any normal person. The best service that a teacher can render any student is to hold up a warning finger to recklessness, irresponsibility, unrestraint, and kindred attitudes and influences, and thus to encourage restraint, thoughtful and deliberate conduct, and perfect self-control.

THE SPRING FESTIVAL

This magazine will reach mid-western readers on their return from a week end at Des Moines with the Western Arts and Vocational Education Associations.

In the past the Western Arts Association meetings have been May Festivals to the mid-western teachers of art. This year, the meeting at Des Moines should be no less a Spring Festival, though held for the first time before Spring is quite assured.

Spring festivals have a distinct purpose in the scheme of life.

We grow stale by routine effort however effective and successful it may be, and the spirit needs refreshment after a winter of short days and long nights. Those of us who attended the meeting at Memphis last year have a vivid recollection of Henry Turner Bailey's address on the Magic Realm of the Arts. Those who did not attend the meetings may get the words in printed form from the Bulletin, but they will not get in full measure the implications of the address, nor the refreshment of the spirit that results from taking actual part in the Spring Festival.

The vocational educationists are meeting with the teachers of art for the first time at Des Moines. At

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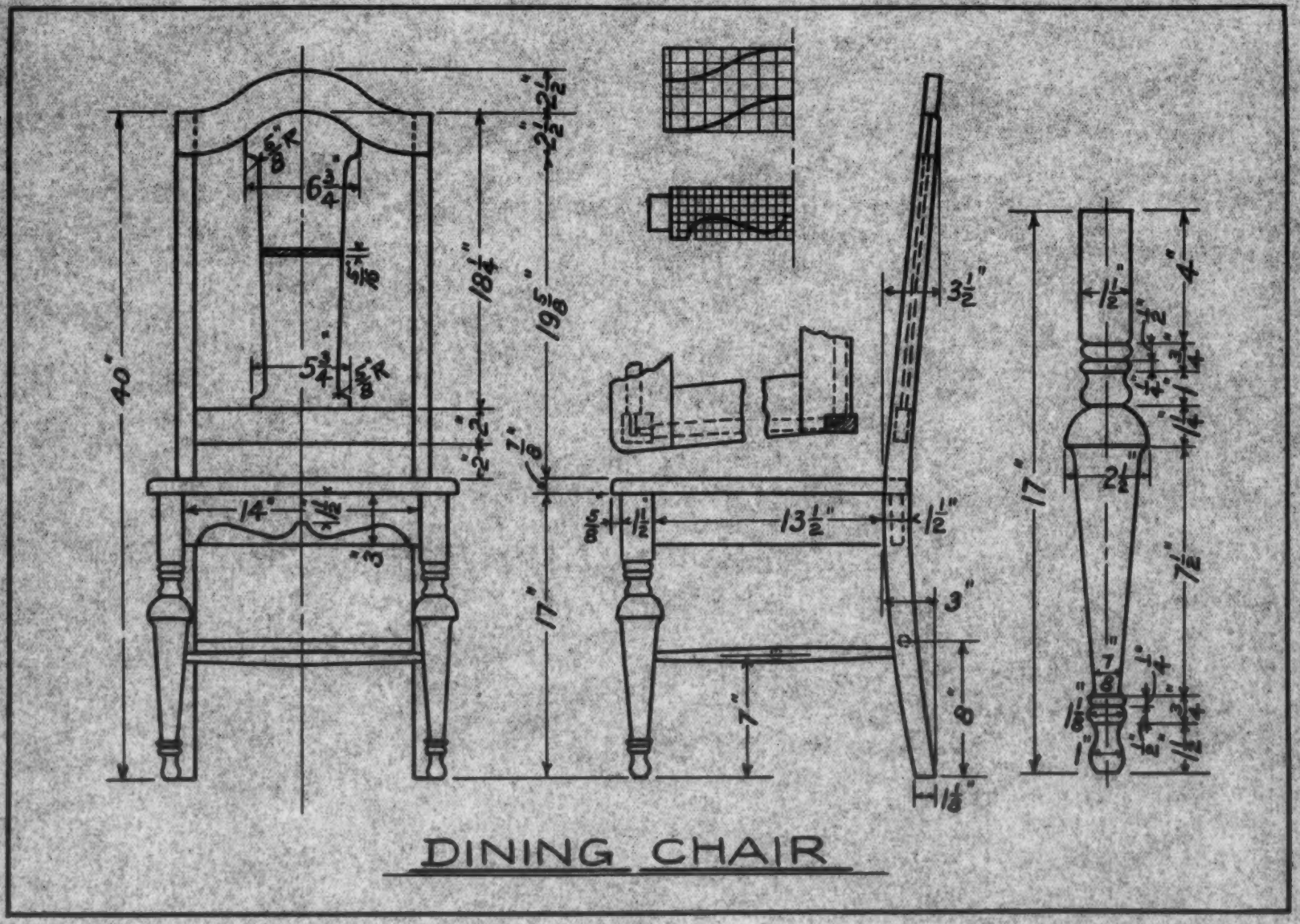

DINING CHAIR

Drawing by G. C. Sinclair, Auburn, N. Y.

For Details see Page 137, Industrial-Arts Magazine, April, 1926.

Entered as second-class matter, April 21, 1921, at the Post Office at Peoria, Illinois, under Act of August 24, 1912.

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TIN SNIPS

Scale—Full Size.

Drawing by James P. Bird and Leo L. Roedl, Kansas City, Mo.

For Details see Page 197, Industrial-Arts Magazine, April, 1926.

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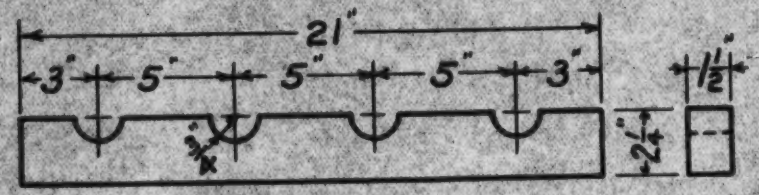
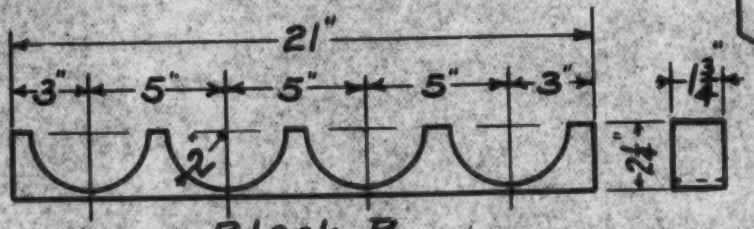


Block A



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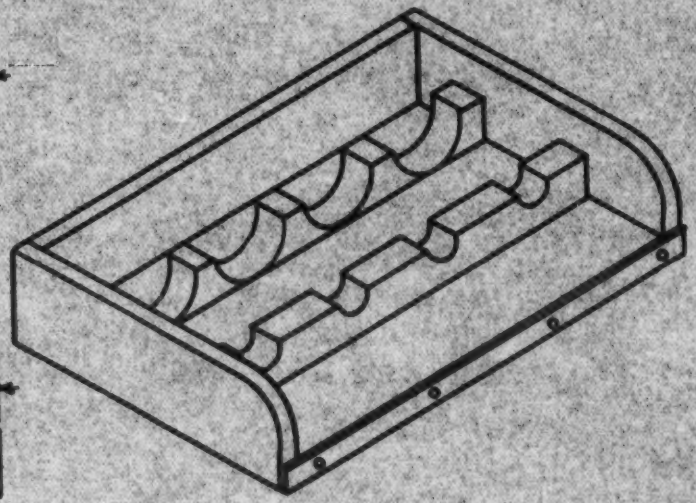
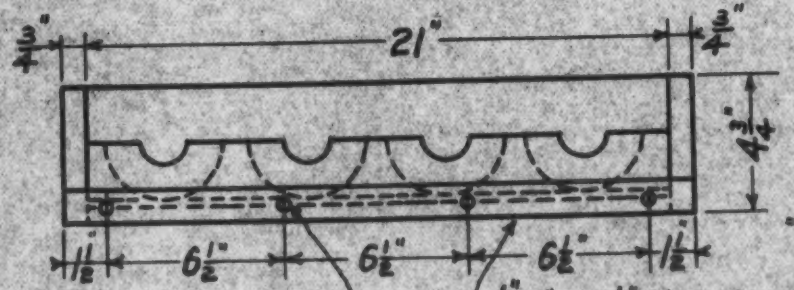
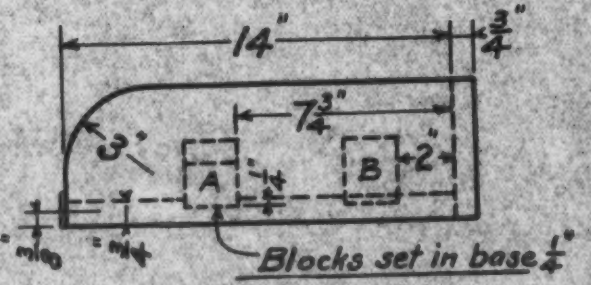




1"#6 F.H. Wood Screws

⅛"x1"x22½" Strap Iron



Blocks set in base ¼"

PISTON BOX

Designed by J. C. Hewitt, Peoria, Ill.

For Details see Page 137, Industrial-Arts Magazine, April, 1926.

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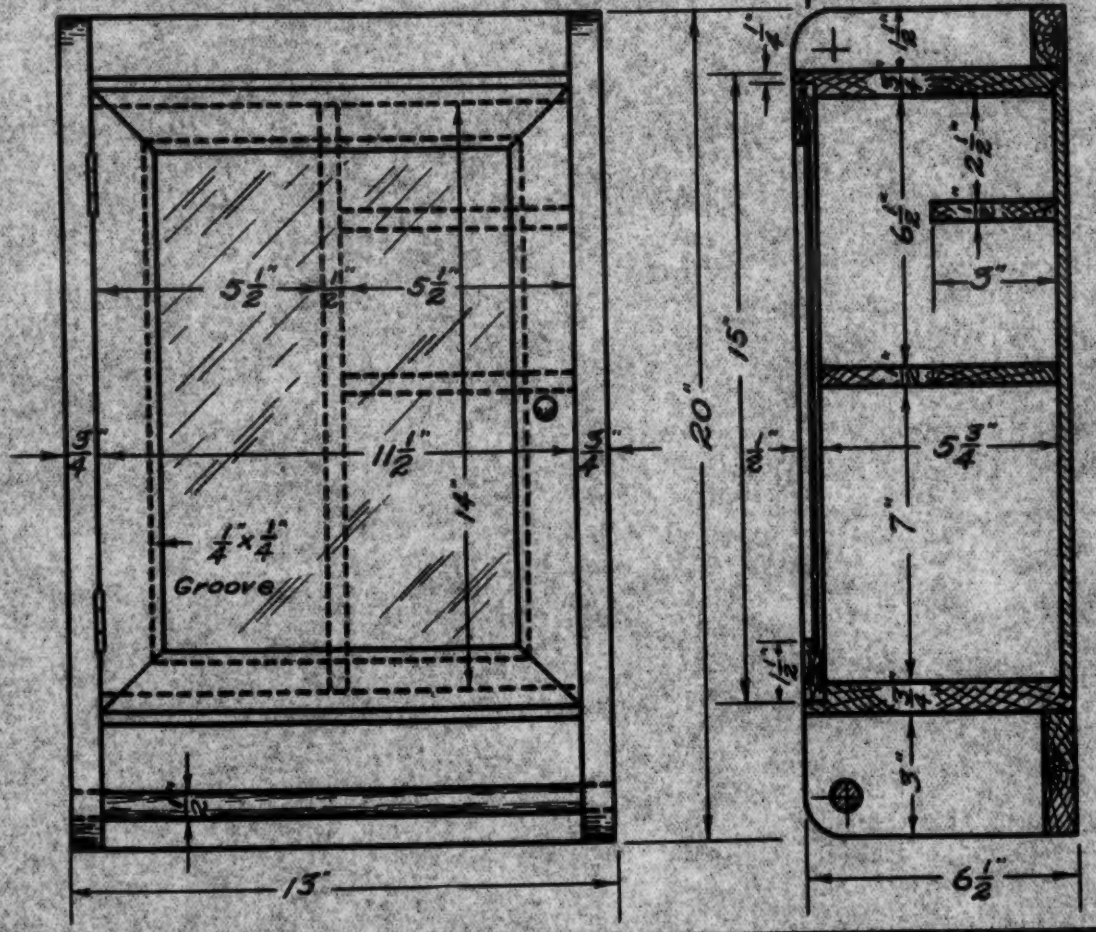
BATH ROOM CABINET

Scale: —=1"



MATERIAL LIST

2 - 5/8" x 6 1/2" x 20" - SIDES
2 - 5/8" x 6 1/2" x 11 5/8" - SHELVES
1 - 1/2" x 5 5/8" x 5 1/2" - SHELF
1 - 1/2" x 5" x 5 1/2" - SHELF
1 - 1/2" x 5 5/8" x 14" - PARTITION
2 - 1/2" x 1 1/2" x 15" - FRAME
2 - 1/2" x 1 1/2" x 11 1/2" - FRAME
1 - 5/8" x 1 1/2" x 11 1/2" - TOP PC.
1 - 5/8" x 1 1/2" x 11 1/2" - BOTTOM PC.
1 - 1/2" x 15" - DOWEL
1 - 12" x 15" WALLBOARD BACK
1 - WOODEN KNOB
1 - FRICTION CATCH
1 - MIRROR - 10 1/2" x 14"

Assemble with finishing nails. Finish with white undercoat and enamel.

MONTGOMERY ALA.

Designed by H. L. Weatherby, Montgomery, Ala.

For Details see Page 137, Industrial-Arts Magazine, April, 1926.

first thought, it may seem that there is little in common between Art Education which excludes vocational purpose and Vocational Education which pronounces it. There has been little successful affiliation between manual, vocational and art teachers. Teachers of manual training and vocational teachers have not generally included art in their list of so-called types of practical education. In spite of the fact that Art Education has become distinctly practical in its application to industrial and social interests, the manual arts, the industrial arts, and the fine arts seem to be subjects quite distinct in purpose and method.

Speaking of the various types of manual and industrial training, Dr. Prosser, in his address before the Vocational Education Society of Boston, emphasized the inclusiveness of aim which characterizes the membership of that organization and voiced the wisdom of following Franklin's injunction that we must "Hang together or we will hang separately."

We conceive that Art Education, as now generally considered and sometimes practiced, is to be rightly included with vocational, industrial, and manual education, and we conceive that a great Spring Festival might well include all of these interests and be a source of inspiration to the teachers of each.

HANDICAP COMPETITION

We have before us the announcement of two splendid competitions offered for pupils in the public schools.

One is offered by The American Humane Association, Albany, New York.

The other is offered by The National Plant, Flower, and Fruit Guild, 70 Fifth Ave., New York City.

The American Humane Association will give four hundred and fifty dollars in cash prizes for posters which emphasize kindness to children and animals. This competition closes on the first day of June.

The National Plant, Flower, and Fruit Guild will give twenty-one cash prizes for the best posters emphasizing interest in the sick and unfortunate. This competition closes on the twentieth day of March, when the prizes will be awarded by three distinguished judges; Lorado Taft, Frank Alvah Parsons and Mrs. S. Harvey Day.

It is not always possible for school classes to undertake outside competition without disturbing the program of school work but these competitions are so adapted to school work in subject and are so generous and well-sponsored that they should be taken advantage of by many teachers of art.

Well conducted competition is a wonderful incentive to effort in school or out of school. We sometimes think it overdone by the teacher who conducts a school of arbitrary hard knocks on the theory of the survival of the fittest. The law against gambling is evaded by giving some return to every competitor. We recall entering a socalled competition with the enthusiasm and confidence of youth only to discover after many hours of hard work that a notable designer had been given a generous fee in advance to assure a high standard of work. We concluded then and are still of the opinion that all competition should be carefully handicapped. Like any enjoyable party a good time should be had by all who participate.

THE ANNUAL MIGRATIONS

Under the caption, "Where Do We Go From Here," Mr. E. E. Elliott of the Oregon State Board for Vocational Education makes some very pertinent observations. Writing in the News Item, he says:

"We are approaching the season of unrest. The birds will soon be passing—already there are signs of the annual migration. Coincidently, in the hearts of school teachers surges the spirit of change. 'Where will I teach next year?' 'I'm through with this job; there's nothing here for me.' When the annual debate takes place on 'Go or Stay,' the former usually gets the decision, at least with the usual run of teachers.

"There are two sides to the question of tenure, as there are to every other. There are advantages in continuous school service, and there are disadvantages. In the case of the vocational teacher, the pressure is in favor of his remaining in the same school from year to year, so long as he can do successful work. But the fact must not be overlooked that there may, and likely will, come a time when a change will be to the best interests of all concerned.

"If a teacher can at all approve himself to a community for a single year, he ought to be able to lengthen the approval into a longer term of years. A single year's service is hardly long enough to gain acquaintance with the local problems and opportunities. Ordinary teachers may flit, like the birdies, but not so the vocational instructor. There are plenty of teachers and principals who are known in the profession as 'one year men,' but in the vocational ranks there can be no such titles. It rests with every instructor to study his own environment, however, and in the light of these conditions determine if a continuance of contract is justifiable and advisable."

VOCATIONAL SCHOOLS AND INDUSTRY

Any course of study that does not include modern operations and processes is valueless. The elimination of these undesirable possibilities depends upon the active, intense and continuous attention and supervision given them by representative industrial men. These men possess first hand information regarding existing industrial conditions and unless they supply such information the training in the school is very ineffective. The course of study cannot be considered a permanent fixture. It will vary as the processes and operations in industry change from time to time, and it is the duty of industrial men to inform the school of such changes. This condition alone necessitates continual conferences between industrial men and vocational men, as well as an interminable active relationship. — R. A. Rostian, Buffalo, New York.

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Proofreading for Printing Apprentices

John F. Locke, Department of Vocational Education, Cincinnati, Ohio

Proofreading is one of the essentials of good printing, for when properly done, it should eliminate all errors, both typographical and grammatical.

A good proofreader is a privileged person, for association with correct capitalization, syllabication, hyphenation, punctuation, spelling and paragraphing, cannot help but leave its influence on one's mind and make one better able to use good English.

Having made these two statements, both of which seem to the writer to be factitious, it would seem perfectly fair to draw a conclusion that to teach proofreading to printing apprentices is justifiable for, at least, two reasons:

1. It is a part of the trade that they are learning.
2. It is a food and a stimulus for good English.

It has been said that anyone possessing a complete knowledge of orthography, syntax, grammar, and English is qualified to read proof. While this probably covers eighty per cent of the knowledge, the other twenty per cent consists of a knowledge of indentions, wrong fonts, make-up, and many other things included under the "style of office."

In view of this as a requirement, it again becomes quite obvious that the teaching of proofreading to apprentices is justifiable in a school where printing is given, most especially if it is given as a trade subject. It is not only justifiable, but it is necessary. It is in reality, a part of the course. Its success, however, will depend upon many factors, two of which are: 1. The previous training and the present and future aims of the apprentice.

2. Proper coordination of composition and related subjects departments.

In speaking of the previous training of the apprentice, what his aims and ambitions are, we are, in reality, giving consideration to the problem of helping him find his "niche." For in printing as in any other line of work, there are many branches, and while some apprentices may be destined to be proofreaders, others will become compositors, pressmen, binders, machine operators, or electrotypers.

Regardless of what branch the apprentice may eventually follow (a matter of great conjecture), it is necessary for him to take some proofreading. The amount of time that he should be made to spend on this topic though should be dependent upon his ability, his desire, and finally his capacity in that direction.

The ability of the apprentice to make the type measurements and calculations demanded of him in the composing room is gained in his study of mathematics. His ability to mark proof is gained, along with his knowledge of type faces and indentions, by his study of capitalization, punctuation, spelling, etc. The study of English, like mathematics and other related subjects, should run along concomittantly with the study of proofreading and composition. All of these subjects should have the proper coordination between the separate departments of the school. The study of English with all of its work in hyphenation, spelling, sentence structure, capitalization, punctuation, word study, etc., presents a wonderful field for the driving home of knowledge and experience in proofreading.

However, it is a certainty that employers much prefer as proofreaders, men who have had as experience, a great deal of their time spent at the case. They are more familiar with the methods of the business and are likely to detect more errors than those whose sole training has been spent in the study of English and language construction. In addition to this, they are more "in touch" with the actual printing side and realize that changes in type cost money: The addition, or omission, of a word in the middle of a paragraph might necessitate the respacing, or possibly the resetting of a whole paragraph.

A proofreader must always bear in mind (1) that each author has his own style of writing, and that, if the author has succeeded in making his meaning clear without violating any of the rules of grammar, they have no right to change his construction. However, if the author has disarranged his words, and made unintelligible rather than clear his writing, it is the proofreader's duty to suggest and make changes.

(2) That both the author and the printer depend upon him to see that not only typographically is the work correct, but that the adopted style has been made uniform throughout the work. Hence it can clearly be seen that a successful proofreader must have, combined with a knowledge of the technical element of the work, a good education; obtained by a thorough and complete study of English either in a recognized school or by having "served his term." So the reading of proof presupposes a superior knowledge of the many styles of material in use and a critical analysis of the work.

The proofreader today has to exercise a great deal of caution, for the reader and buyer of printing today is more critical than the person of fifty years ago. He notices mistakes, blemishes, lack of uniform usages, etc., very quickly. All of these things have their reaction either directly or indirectly upon the volume of work any one printer has to do.

Proofreaders' Marks

Type has one great advantage over handwriting. Errors in print are easily detected. There is no chance to say that an "a" is an "o", or that an "e" is an "i" or that the peculiar mark on the bottom of the line is a period when in all respects it resembles a comma, or vice versa.

The marks themselves have been adopted for the sake of expediency and are universally used in proofreading. Like shorthand these marks aid in a great saving of time and space. They should be studied until their meaning and use are clearly understood.

The first step in proofreading is to make sure that the proof is clear and distinct and that it has a sufficient margin on both sides of the paper for the marking of errors.

Proof-paper should be thin, sized, smooth, and but lightly dampened. Ink should be stiff and repeatedly rolled on the ink table, so that it can be thinly and evenly distributed upon the type. The type should be rolled slowly and carefully, to produce a readable proof. An overinked proof prevents the reader from detecting imperfect letters.

The proof should be accompanied by the copy, from which it was set, together with the order and instructions. The original manuscript should in every case, accompany the proof. Each successive set of proofs should also be accompanied by the ones they were corrected from. This saves the time that would otherwise be required in re-reading the whole job.

Place the proof on a desk or table where the light is good, and in a room where there is little or no noise. Efficient proofreading can be done only in a room where there is small chance of interruption.

Always use a sharp lead pencil that makes a clear and distinct mark when correcting proof, for the marks which are made, of necessity must be readable to the compositor, who does the correcting, so in order to save time make these marks neat, clear, and distinct.

It is advisable to first line up the paragraphs. Use the first paragraph for a guide and by drawing a faint pencil line down the proof any inequality in the indention can be detected at once. When the proofreader wishes to draw attention to the fact that a new paragraph should be started and the beginning word of the sentence should be indented he uses the paragraph sign, ¶.

Verify the divisions of all the words that are divided at the ends of lines. Also make sure that the remainder of each divided word is placed at the beginning of the following line.

See that all headings and subheads are correct; that is, that their position is right, their size correct and that the proper type face has been used.

Verify the running titles, folios, chapter headings, page and section numbers to see if they are consistent and consecutive.

Glance over the proof for any glaring errors and mark all typographical mistakes such as broken letters, improper breaking of lines, bad spacing, and wrong fonts. When letters of a different kind of type are found, attention is drawn to them by inserting in the margin *wf.* which stands for wrong font.

Do not read from the proof to the copyholder; let him do all the reading from the copy. Read every word slowly and carefully in order to make sure that the spelling is correct. It is the duty of the proofreader to see that all spelling is uniform. The same word should not have two spellings in the same piece of work. Some words that are easy to overlook in this respect are: judgment, enrollment, etc.

Analyze each statement and endeavor to grasp the meaning. For if the meaning is not clear and the passage is incorrectly punctuated, it is the proofreader's duty to punctuate it. Oftentimes a writer will fail to properly punctuate his work and in that case it is the proofreader's duty to do so, if the compositor has not already done so. If the compositor understands punctuating, he may have already inserted the proper marks and thus have shown his ability and skill. Compare all statistics, cuts, figures and dates closely with the copy. Overlook nothing, for the proof, after leaving the proofreader's hands finally is ready for publication.

It will often happen that a "query" will have to be made. These should not occur unless necessary; and in making a query, always indicate it so it is easily understood. The proofreader must place himself in the other person's place. If his copy is unintelligible to you, don't come back at him with a "proofreader's mark", that as a layman, he may be unfamiliar with. In other words, use the query as little as is possible but when it is used the proofreader must make his point clear.

Draw a line through every error and mark the correction on the margin of the proof opposite the line in which the error occurs. Connect the error and the correction by a line. When marking a proof, if the error is at the left of the center, mark the correction in the left-hand margin; if the error is at the right of the center, mark the correction in the right-hand margin. The corrections should be placed directly opposite the line in which the errors occur and also in the order in which they occur. To be sure of having room for this purpose, the first correction on the left of the line should be placed some little distance from the text, the first one on the right should be placed close to the text, then alternate them.

The writer considers it advisable to draw lines from the error to the margin on the side of the paper, thus connecting the error with the correction. A great many writers disagree with this. But the writer has had the experience that with apprentices, more particularly, the corrections are more apt to be understood and less liable to be misplaced by having them connected to the errors by a line.

All proofs, whether galley or page-proofs should be initialed in the upper right-hand corner after completing their reading. These proofs should be returned to the proper person for correcting, neatly arranged in their correct order, and pinned on top of the copy.

After all of the corrections have been made a second proof should be taken and this is called a *revised proof.* This proof should be compared with the first proof only, unless part of the job has been pied; in this case it is necessary to compare again with the original copy.

The bulk of straight matter is now set on machines, and it has been found that a great saving of time can be effected by having the original copy revised for correction by the proofreader before the matter is set at all. This tends to do away with a great deal of resetting after the initial proof has been taken.

It must be remembered that in all matter set on linotype, even the slightest change involves, at least, the resetting of the line. While minor corrections like substitutions, etc., in matter set by hand or on the monotype necessitates only respacing.

THE INVENTIVE INSTINCT AS SEEN IN THE DESIGNING AND FINISHING OF BIRD HOUSES

Harry C. Lassen

Almost every manual training teacher puts out half-a-dozen or more bird houses every year. Bird houses have a universal appeal. They are something definite and real, and at the same time are within the boy's ability; they are a constant source of freshness and newness in the shop, the old forms being treated in an infinite succession of interesting variations. The boy making a bird house is not laboring on an endless series of dreary "O.K.s," but is creating something of value; something that a pair of real live birds will live in while rearing their young; something that father and mother will point to with pride, saying, "John made that!"

While we're deciding on a design, of course our boys learn something about birds. How big must the hole be, for the bird we want to attract? Can I put on a perch? (Only the boy prefers to call it a porch.) What colors of paint can I put on without frightening the birds away? Where should I hang it? They will talk this way for hours, if you'd let them.

Have you ever let a class discuss questions of design and finish of bird houses? Try it, if you never have, and you'll learn a lot about your boys. I learned, for instance, that a seventh grade lad wondered how the stork, having such a slender bill, could carry such heavy loads.

Once the house nears completion, there comes the question of finish. The boys are so eager to be spreading paint that they lose some of the expected delights of nailing, an operation that heretofore fascinated them. If the house is to be covered with bark, for instance, it is not so easy for a sixth grade boy to see any good reason for making the joints meet accurately. But anyway, it's a lot of fun, and at the same time a most serious, responsible task. Speaking of bark, I have found that the birch bark which is brought in rolls is far easier to apply than the kind you rip from a tree.

In finishing the house, the boy has an opportunity to exercise his inventive faculty. Boys like to be original and unconventional, and once they understand that various materials may be used in making the house appear

inviting to the bird, it doesn't take them long to find something new. Every year I am amused by waiting to see how long it will take them to discover that wild grapevines make a superior material for giving the houses a rustic appearance. Boys can always find plenty of it—indeed, altogether too much—if they live at all near a wooded place. Even here in Chicago many of the boys get out into the forest preserves and come back with countless yards of it. The country is full of wild grapevines, and they are unexcelled for the purpose, being flexible and easily worked.

Sometimes a stucco effect is desired. To me, it is very amusing to see the young inventors struggling with the idea. We used for a while a commercial preparation, some kind of cement, and found it admirable, but the boys like to be figuring out something for themselves. Once one of my boys saw me mixing some crack-filler of saw-dust, water, and glue. He asked if he couldn't stucco his bird house with such a mixture. When I suggested that glue is soluble in water he was undismayed. He would paint his! I allowed him to try it, after roughening the surfaces of the wood. The resulting finish was interesting, even if somewhat flattened by the paint.

We discussed the idea in class one day. The boys decided to try varnishing their houses, and sprinkling saw-dust on the wet varnish, much as beads are applied on lamp-shades. One lad asked if planer chips wouldn't be better than saw-dust, and everyone agreed that they would. If the chips are small enough, we have found that they are excellent. The varnish, we found after some sticky experiments, must be applied very liberally indeed, to make the chips stick. It takes a long time to dry, but what is that, when we have *invented* something. The boys discovered that planer chips stained one color, and stuck on over a contrasting color give a pleasing effect, less lurid than one would expect.

I suppose almost everyone interested in bird houses has made the excellent hanging wren-house shown in Mr. Worst's "Problems in Woodwork." We paint this house dull green all over; the perches and eaves remain that color. On the sides and ends, we put a coat of the "loudest," most vivid green obtainable. On the outer edges of the perches and brackets we put two good coats of white. A day later, a very heavy layer of quick-drying varnish is applied over the vivid green, and then come the planer chips, which have been stained walnut and given plenty of time to dry.

One shop can easily accommodate several dozen of such bird houses. They may be dried at once, if they are strung on a wire by means of screw-eyes.

THE RIGHT WAY TO SOLDER
Clean Work Essential
C. C. Hermann, Moline, Illinois

A clean surface and a properly heated bit constitute the principal requirements of a good soldering job. Dirt spots on the work prevent the solder from uniting the pieces of work. The solder closes about the dirt, boils, and then draws away upon cooling, leaving the pieces separated at that point. At times the dirt spot is entirely covered with solder and the workman is fooled in believing that he has produced a good piece of work only to find that the solder has simply bridged over the dirt and the work readily shows up the defect.

The solder will not clean away the dirt. Take, for example, copper tubing or copper wires. Copper always oxidizes on the surface, resulting in a dark coating. The solder will not stick to this coat, making it necessary to remove the oxidation by scraping the work or cleaning with a piece of emery cloth. Muriatic acid cut with zinc is usually resorted to as a cleaning medium, however, even frequent applications of this acid fail to remove the dirt at times sufficiently to insure a secure joint. Take as an example, the automobile radiator. Here we usually have an abundance of dirt to contend with, particularly if the leak is near the bottom, as it usually is. Grease from the motor, road oils and dust work into the break and coupled with the ordinary oxidation that takes place presents a soldering job that will tax the ability of the experienced tin worker.

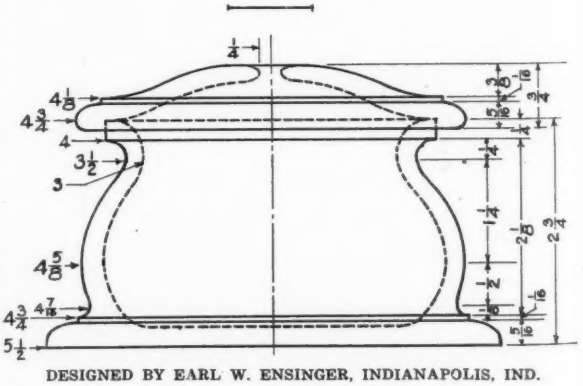
Considerable time will be required to clean the job thoroughly. Acid must be applied time after time and the work boiled thoroughly before the solder will stick. A blow torch is a mighty handy instrument in this class of work. The flame may be directed on the work in the exact spot required and heated to the proper temperature, making the cleaning easier. A wire brush also assists materially in removing the dirt and oxidation.

All metals oxidize in the atmosphere to some extent; some metals more than others. Some metals oxidize considerably more when heated than when cold. Take a copper wire and scrape it bright with some square edge instrument. Lay the wire aside for a short time and the brightness soon disappears; the bright portion takes on a dull appearance. This oxidation of the surface is caused by the atmosphere coming in contact with the bright surface. This is also known as tarnish. Heat a piece of steel to a red heat and allow it to cool in the atmosphere. A heavy scale forms on the surface. Take another piece of bright steel and allow it to lay in the weather for a period of time and subject to the various atmospheric changes and similar changes in the surface of the steel takes place. In the latter case we call it rust. This rust differs from the former oxidation in that pits appear in the steel, whereas after heating and removing the scale the surface is fairly uniform.

In soldering we call this oxidation dirt; however, there may be other foreign matter such as animal, vegetable and mineral matter which collects on the surface and must be removed before the work can be successfully soldered.

After the work has been cleaned it is necessary to apply a protective coating in order to prevent further oxidation until the solder has had an opportunity to cover the surface. This protective coating is called a flux. Chloride of zinc is the most common soldering flux. This is produced by placing small clippings of zinc in hydrochloric acid, commonly known as muriatic acid, which has been diluted with equal parts of water. When the zinc is added, bubbles rise to the surface caused by the acid vigorously attracting the zinc, and zinc should be added until no more bubbles appear. Sal-ammoniac makes a very good flux for copper and brass. The flux is applied with a small brush or feather, after thoroughly cleaning in the ordinary way.

YARN BALL HOLDER



DESIGNED BY EARL W. ENSINGER, INDIANAPOLIS, IND.

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, pattern-making, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration.

A DINING CHAIR

C. C. Sinclair, Auburn, New York

(See Supplement No. 13)

The dining chair shown in the supplement drawing makes up well in mahogany or walnut; however, it should be made of such wood as will match up with the other furniture in the dining room.

The chair should be held together by means of mortise-and-tenon joints, except the top back rail which should be fastened to the legs by means of a half lap

DINING CHAIR

joint. These half lap joints should be glued and reenforced by screws. The heads of the screws should be counter sunk and the holes plugged with the same material as the chair.

The seat of the chair should be upholstered with leather to match the finish on the chair.

Bill of Stock

2—	⅞″x2¾″x15 ″	—Side rails.
1—	⅞″x2¾″x15½″	—Front rail.
1—	⅞″x2¾″x14½″	—Lower back rail.
1—	⅞″x2 ″x14½″	—Center back rail.
1—	⅞″x5 ″x15 ″	—Top back rail.
2—1½″x1½″x17 ″		—Front legs, turned.
2—1 ″x1 ″x16½″		—Spindles.
1—	¾″x ¾″x14 ″	—Spindle.
1—	¾″x ¾″x15 ″	—Spindle.
1—	⅞″x3 ″x18¼″	—Front of seat.
2—	⅞″x3 ″x12½″	—Sides of seat.
1—	⅞″x3 ″x15 ″	—Back of seat.
1—	⅛″x6¾″x19¾″	—Back panel.

Three-fourths of an inch has been added to the length of the above stock for each tenon.

TIN SNIPS

James P. Bird and Leo J. Roedl, Kansas City, Missouri

(See Supplement No. 14)

As pupils often take more than one year of forging, this problem is offered for the advanced student as it will appeal to him through its practicability and give new experiences in forging.

For snips of the size given in the drawing, a piece of stock 5/16″ by 1″ by 5½″ will be required for each jaw. For the cutting edge an old file can be welded on the mild steel out of which the snips are made. The teeth should be ground from one side of the file and the file annealed. One edge of the file should come flush with the edge of the machine steel. The other edges should be beveled off. The teeth which remain should be placed next the mild steel. Flux is placed between the tool and mild steel, and the first weld is made in the fire by pinching the two pieces together when a welding heat has been reached. Excellent welds may be obtained if Lafetite welding plates are used as a flux; with these the weld can be made at a sufficiently low heat so that the tool steel will not be injured. Needless to say, the tool steel should extend for the length of the cutting edge only. In subsequent forging, care should be taken that the part containing the tool steel be not heated hot enough to burn the steel.

In forging the piece to shape, the handle may be made in several ways. First, the eye may be punched and formed to shape. Second, it may be drawn out and welded at point C (see drawing). Third, the weld at C may be made with an oxy-acetylene torch. Punching and oxy-acetylene welding have proven the most successful.

The bolt should fit a square hole in one jaw and be a running fit in the other. Adjustments for the tightening of the jaws are made by tightening the nut on this bolt. Care must be taken to get the length of the square part of the bolt a little less than the thickness of the paw through which it fits, and the length of both the square and round parts a hair's breadth more than the thickness of both jaws. To insure a good fit the threaded part should be smaller in diameter than the round shank of the bolt.

The jaws should be ground to shape, not forged, as forging may open the welds.

In hardening, dip the cutting edge first and draw the temper to a purple color.

The two joining surfaces should be ground perfectly flat or a trifle concave so that the edges will cut from their entire length.

PISTON BOX

J. C. Hewitt, Bradley Institute, Peoria, Ill.

(See Supplement No. 15)

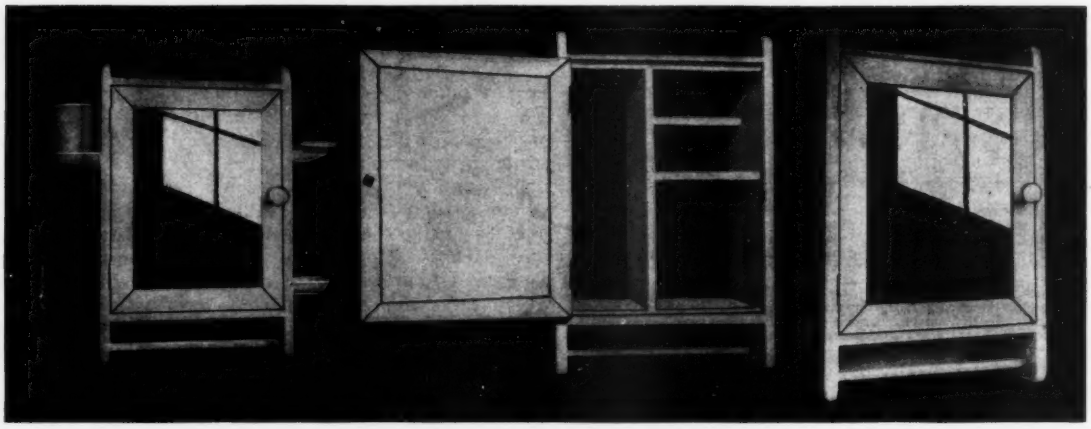
Every teacher of auto mechanics knows what happens if boys use a bench top, a running board, or even the shop floor to lay down pistons when engaged in an engine job. The supplement drawing illustrates a utility which affords a convenient, clean, and safe place for holding pistons and connecting rods, etc. It is suggested that, where six or eight cylinder engines are repaired, the box be made with six or eight divisions. In any event it is well to number the divisions so that the pistons may be returned to their respective cylinders. The construction is apparent from the drawing.

BATH ROOM OR MEDICINE CABINET

H. L. Weatherby, Director of Manual Arts, Montgomery, Alabama

(See Supplement No. 16)

The medicine cabinet is always a popular supplementary project for the woodshop, and the one illustrated has to recommend it simplicity of construction, general utility and inexpensiveness. It can easily be made by the average seventh or eighth grade boy, at an expense of a

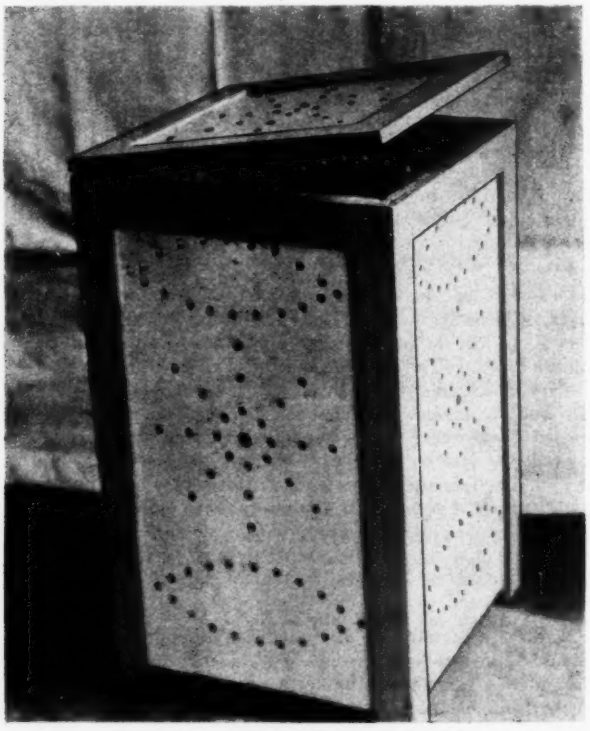


THREE VIEWS OF THE MEDICINE CABINET.

dollar or less which, when we consider the purchase price of a high-grade, well-enameled cabinet with a mirror door, is a most reasonable cost.

Most of us live in towns or cities that boast of five-and-ten-cent stores that do not limit their merchandise to five-and-ten-cent articles. The beginnings of the cabinet illustrated came from one of these stores in the form of a bath room mirror, framed in a white enameled frame and at the modest cost of twenty-five cents. The rest of the cabinet should be made of a soft, cheap grade of pine or other inexpensive wood, since it is to be covered with paint. The shelves may or may not be grooved into the sides, and the partitions should be arranged to accommodate bottles of various sizes. The cabinet must be built to fit the door, or a glass may be purchased cut to a particular size.

A few added bathroom fixtures attached to the outside of the cabinet, such as a glass holder, a toothbrush rack, and a soap dish add much to the value of the cabinet and its attractiveness.



CLOTHES HAMPER.

The cabinet should be finished with two coats of flat white inside and outside, and two coats of enamel on the outside.

A CLOTHES HAMPER

A. E. Gray, Stockbridge, Massachusetts

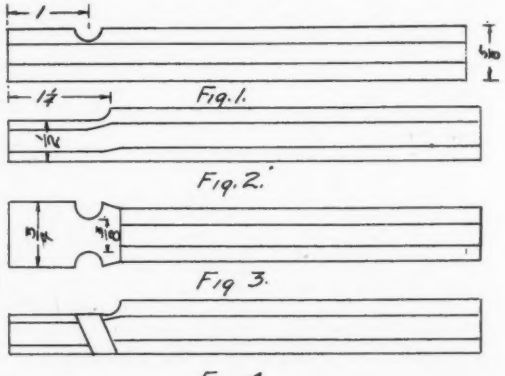
The accompanying photograph illustrates an easily-constructed, cheap, yet practical, and useful household article—a clothes hamper. While it has these attractive features, in addition it affords a great variety of tool use. The panels are made of beaver board, perforated with a punch to provide ornamentation as well as the necessary ventilation. Corner pieces are of wood made by rabbeting out a piece of square stock, or by butting and nailing two pieces together, the thickness and width being left to the taste of the worker. The bottom of the beaver board may be supported upon small strips of wood, glued and nailed with small brads, to the inside of the four panels or sides. To give rigidity, a piece of quarter-round or a triangular-shaped strip is glued and nailed in each inside corner. The lid is made similar to the sides and hinged. And finally the whole is painted to conform with the surrounding furnishings, floor, or walls.

A similar project to the hamper and one which the writer has found excellent for elementary classes, is that of waste paper baskets made of beaver board, covered with attractive patterns of wall paper. The assembling of these baskets follows the general plan employed in the hamper. Many very pleasing effects can be obtained by selecting parts of designs, from nursery and dining room wall paper.

THE FORGING OF A PAIR OF NIPPERS

Jay F. Knowlton, Supervisor of Boys' Industrial Work, Hibbing, Minnesota

In the drawings that follow you will find the steps in forging a tool that is handy in any home as well as



any shop. The skill required is perhaps a little high for the average student but if a little care is exercised, no great difficulty should be experienced. The drawing is self-explanatory and very little comment is necessary.

The stock used was 5/8" oct. special tool steel. This was chosen because it is often found in the stock rack of the average school system. Perhaps the most difficult part is the problem of making both pieces alike. It is necessary to not only to make the shapes alike but also to place your fullering on the same side of each that they may fit together when completed.

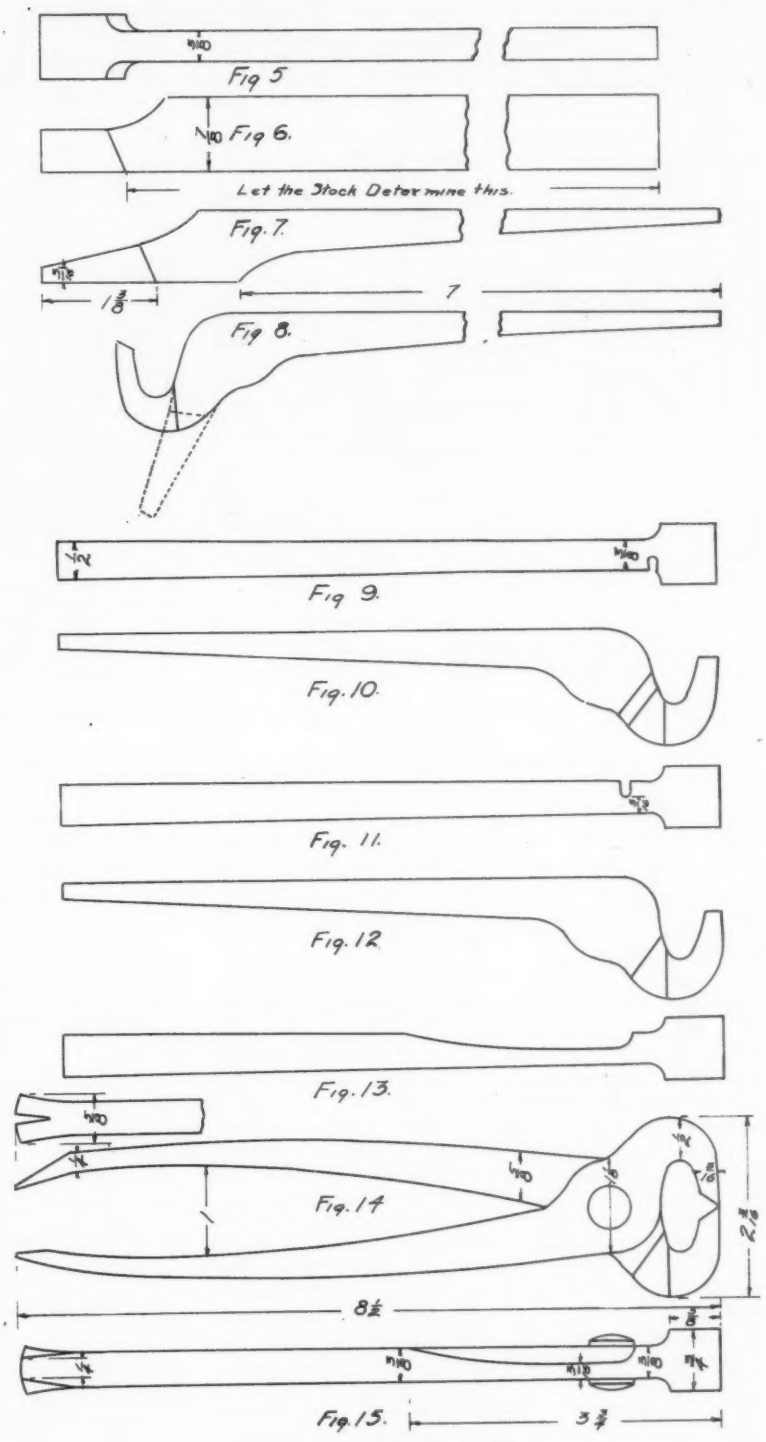
After the two pieces have been forged, filed to shape and buffed, the holes should be drilled and the two pieces held together with a temporary rivet. This is done that the cutting edges may be filed to shape and length so that the handle may have the proper opening. They should also be buffed on the cutting face while the nippers are closed that the face may be made even.

Now remove rivet and temper the cutting edges in the same manner as the cold chisel is tempered after which buff and rivet.

These notes were taken while the nippers were being forged from this size stock so no difficulty should be experienced in the dimensions not coming true.

Care should be exercised in completing the operation in Figure 5 as it is necessary to draw a 5/8" piece of steel to 7/8" wide. This can be done with as high a heat as the steel will stand and then use a set hammer and sledge; a high heat and a heavy blow gives width. This will also be of importance in Figure 1.

The bending in Figure 8 should be done over the round edge of the anvil. This edge should be placed where the second curve is wanted.



DETAILS OF FORGING NIPPERS.

1— 7/8"x3 "x16½"—Middle brace.
2— 7/8"x6 "x30 "—Jaws.
2— 7/8"x1½"x18 "—Levers.
1— 7/8"x1½"x12 "—Brace for lever.
2— 7/8"x2½"x 8 "—Lock.
1 piece of broom handle 18" long for lock bar.
2 1½" fast pin butts.
10 1½" No. 9 flat head wood screws to assemble lever.
4 10d. finishing nails to fasten middle brace.
12 8d. finishing nails to fasten bottom brace and triangular lock pieces to levers.
6 6d. common nails to fasten back jaw to posts.

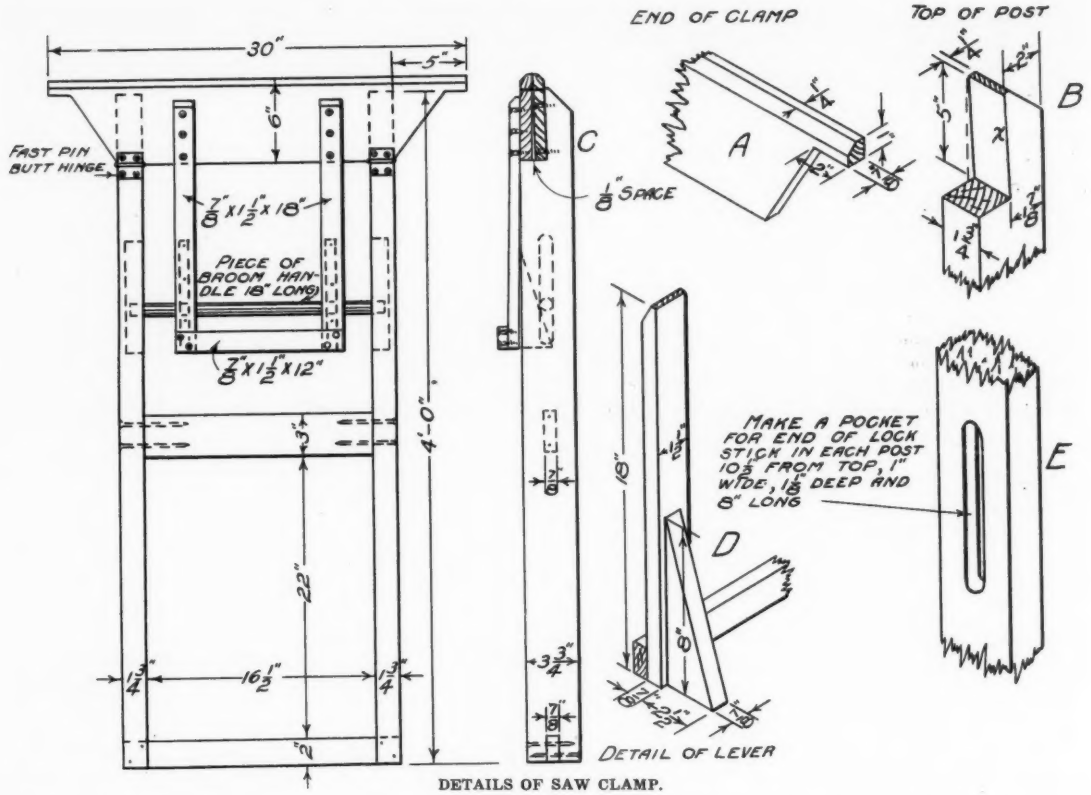
A SAW CLAMP

L. M. Roehl, Ithaca, New York

The following comments are some of those that have been made on the saw clamp which is shown herewith:

"A saw can be placed in the clamp and removed quickly and easily." * * * "It holds the saw rigid while one is at work on it." * * * "One can stand it where light is right for the work." * * * "It is easy to make and inexpensive." The bill of material is as follows:

Pieces	Dimensions	Use
2—	1¾"x3¾"x 4' 0"	—Posts.
1—	⅞"x2 "x20 "	—Bottom brace.



DETAILS OF SAW CLAMP.

Detail drawing A shows the way to make the ends of the clamps. This provides a way to hold the saw for filing without removing the handle. The upper outside edge of each jaw of the clamp is chamfered so as to facilitate clearance for work with the file. The rear jaw of the clamp is fastened to the post with three 6d. common nails at each end.

Detail drawing B shows the way to lay out and cut the upper ends of the posts. It should be noted that the front edge of the post to which the clamp is fastened, marked X in the drawing, is not parallel to the back edge of the post. It is 2" from the back edge at the top and 1⅞" at the bottom. This is to provide a clearance between the jaws of the clamp at the bottom, as indicated at C in the upper end of the end view. If this were not made, the clamps would press the saw at the bottom and not at top, allowing it to vibrate while filing.

Detail drawing D shows the way to make the lower end of the levers and locking device. It will be noted that there are two levers which are held with a cross brace at the bottom. At the front of each lever a triangular block is fastened with nails. The upper ends of the levers are fastened to the front jaw of the clamp, as shown in the side view of the clamp. They may be fastened with screws or nails. If nails are used, they should be driven from the saw side of the jaw and clinched on the outside.

Detail sketch E shows a pocket which is 1" wide, 1⅛" deep and 8" long, the top end of which is 10½" from the upper end of the post.

Locking the saw rigidly in place between the jaws is accomplished by pla ing a round stick about ⅞" in diameter and 18" long between the posts with an end in each pocket.

When a saw is placed between the jaws of the clamp and the lever drawn, the round stick slides down the slanting triangular block and locks or holds it. A piece of broom handle is very suitable for the round stick. Merely lifting the stick releases the saw.

QUEEN ANNE TYPE CHEST

Anton Anderson and Alan H. Nicol, Technical High School, Buffalo, N. Y.

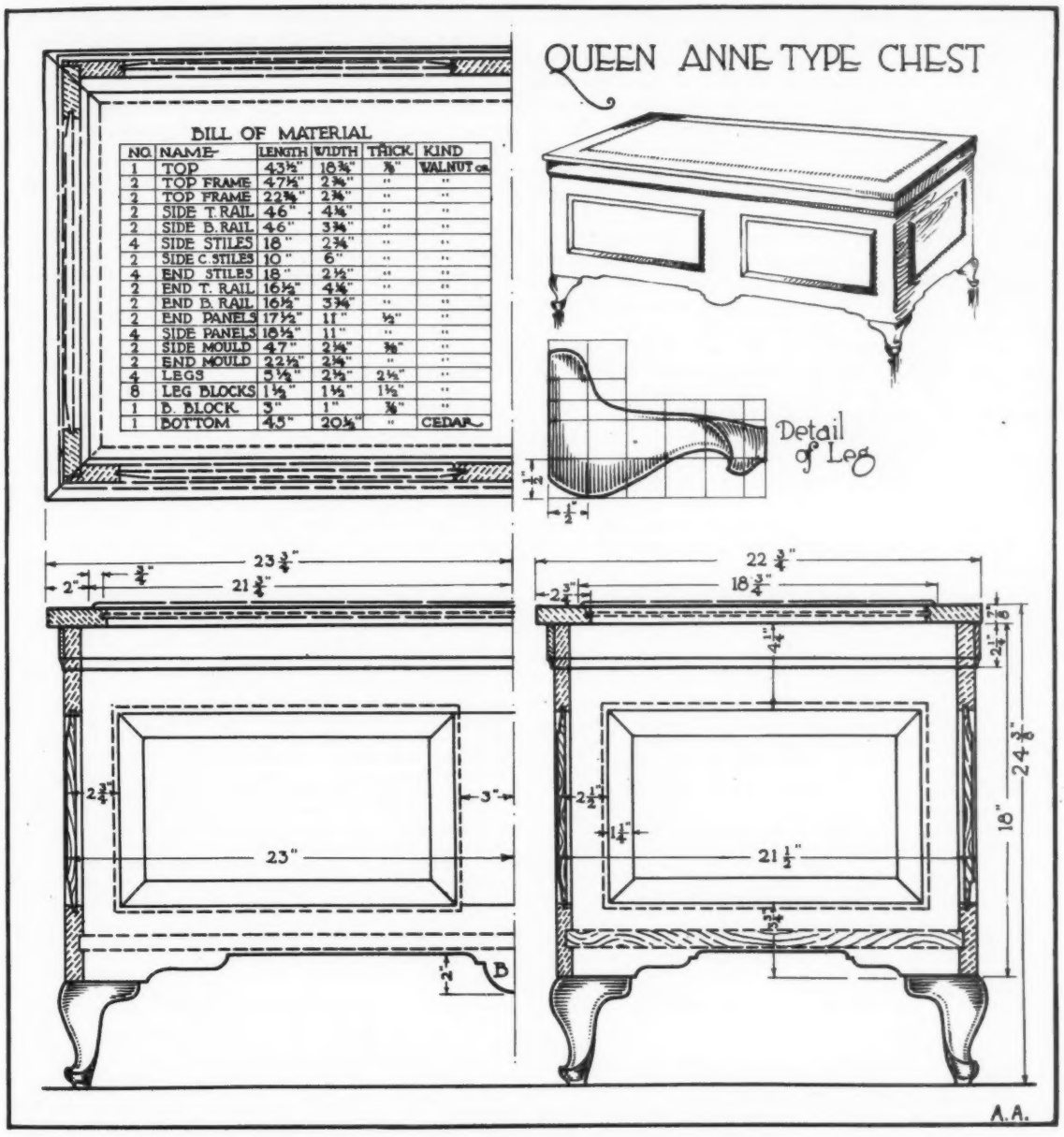
The Queen Anne period style of design in furniture dates back to the reign of Queen Anne in England during the seventeenth century. It is one of the period styles which has become very popular, and features of the design may be found in numerous articles of present day furniture.

The addition of these features to the making of a chest enhances the ornate qualities considerably. It can be used in almost any location in the home with freedom and is usually made of the more expensive woods, and lined with ¼" cedar. The cedar lining doubles its utilitarian value.

The chest may be made in any school which has a band and circular saw. It may be made entirely with the aid of hand tools if a combination moulding plane is part of the tool kit. The dowel type of construction is used throughout.

To make this type of a chest it is essential that a full-sized detailed drawing be made first. This facilitates the making of patterns for the lower rails and legs. (Patterns are usually made from ¼" stock band-sawed and filed smooth.) For the drawing a piece of detail paper 48" x 36", a large drawing board, and other drawing paraphernalia are needed.

The accompanying drawing is made to one-eighth scale. All dimensions should be taken from the drawing and bill of material. The detail drawing should be laid out exactly as shown in scale drawing, giving the front, end, and top views. These are essential to a thorough understanding of the construction used. The directions for drawing are as follows:



NO.	NAME	LENGTH	WIDTH	THICK.	KIND
1	TOP	43½"	18¾"	⅞"	WALNUT ca.
2	TOP FRAME	47½"	2⅜"	"	"
2	TOP FRAME	22¾"	2⅜"	"	"
2	SIDE T. RAIL	46"	4¼"	"	"
2	SIDE B. RAIL	46"	3¾"	"	"
4	SIDE STILES	18"	2¾"	"	"
2	SIDE C. STILES	10"	6"	"	"
4	END STILES	18"	2½"	"	"
2	END T. RAIL	16½"	4¼"	"	"
2	END B. RAIL	16½"	3¾"	"	"
2	END PANELS	17½"	11"	½"	"
4	SIDE PANELS	18½"	11"	"	"
2	SIDE MOULD	47"	2¼"	⅜"	"
2	END MOULD	22½"	2¼"	"	"
4	LEGS	5½"	2½"	2½"	"
8	LEG BLOCKS	1½"	1½"	1½"	"
1	B. BLOCK	3"	1"	⅜"	"
1	BOTTOM	45"	20½"	"	CEDAR

Place paper on board so that it will not interfere with use of T square along lower and left hand edges.

Draw floor line 2" from bottom of paper and across entire sheet.

Draw center line 26" from left hand side of paper.

Determine extreme height and draw in lines of top which show:

a. Thickness of top frame.

b. Construction of panel into frame.

Determine overhang of top over side and end of chest.

Draw to dimension given.

Fill in thickness of end (cross section) showing panel and the construction of dado in bottom rail to receive bottom.

The end view of moulding is also shown here.

Draw in complete end view as shown in print. The foot may be drawn in by laying out the series of 1" squares. Its length is 5½"and it is 2½" square without brackets.

The end view may be drawn to right of front view, or on a separate sheet of paper. If the same sheet of paper is used, the center line previously used may be worked from. One-half of end view will overlap or lay into the front view, which is considered perfectly proper and the most accurate and reliable method of showing that part of drawing for practical purposes. The other half shows the back side of chest, all construction being laid to the right of center line. The complete drawing of the end view should be outlined in blue to distinguish it from the front view, making it easily understood and interpreted by the worker. This is one of the marks of distinction used throughout the furniture industry.

The complete end view may also be drawn separately or apart from the front view, as in the accompanying drawing. This is advisable for the younger students, as it eliminates the possibility of confusion which might accompany the drawing of one view over the other. The feet may be excluded from this view to eliminate the repetition of drawing them. Figures may also be left out.

In full-size detail drawings the measurements may be taken from the drawing itself, as figures would only detract from the general appearance of the finished drawing. A cross section should be drawn to make the end wood sections more readily discernible. (All end wood is always cross-sectioned in a drawing of this type.) This

proves a big help to the student who has difficulty in distinguishing how the various parts are placed, their relative shapes, and how they are joined together.

The third view is called the plan or top view. This is drawn in red. It should be drawn just above the front view, making use, again, of the center line previously drawn. It is advisable to draw a complete top view as shown in print. It will be noticed that the overhang of the top varies in the back of the chest for the purpose of hinging the top with common brass butts. Care should be taken in the layout of the top view to show the proper margin of the top as shown in the print. The transferring of all lines from the front view upward is the safest method of completing this view, since it eliminates all measuring, except for the measurement of the width taken from the end view.

Draw in the thickness of the end, the thickness of the panel, and the types of construction employed. Draw in the mitered lines of the top last, as in this way the possibility of mistakes is reduced to a minimum.

A final check is needed to see that everything is included in the making of the drawing, since much depends upon accuracy and correctness as the initial step in the completion of the project.

The material used in the construction of the chest is one-inch American walnut which is selected for its beauty of grain texture. It is dressed to seven-eighths of an inch in thickness. The bottom, which is the exception, is made of Tennessee red cedar, and conforms with the ¼" cedar lining which is nailed in place with ¾" nails.

One-inch stock is surfaced on one side to eliminate warp and then re-sawed to three-eighths inch thickness. This is surfaced to ¼" thick, cut to proper length, and fitted together carefully inside of the chest before nailing in place. It is advisable not to glue this thin stock together into panel form before fitting into place as glued pieces are more apt to expand. Where the joints are free the expansion is overcome.

The usefulness of the chest may be increased by adding a tray 24" in length, 4" deep and the full width of the inside of the chest. It is made of ¼" re-sawed stock and slides on two strips nailed on the inside of the chest.

Ornaments may be added to enhance the beauty of the chest. The ornaments are made of fiber, can be glued on very readily, and take any kind of stain which one may care to use.

It should be noticed that this chest does not show a handle. The only trimming needed is three 3" common brass butts, a Yale lock, two chest elbows, and one set of ¾" domes of silence.

TWO METAL WORK PROJECTS

H. D. Campbell, Cicero, Ill.

The accompanying drawings illustrate two successful bench metal and forge projects, worked out in the J. Sterling Morton Township High School. The drawings contain practically all the information necessary for selecting the material and making the projects.

NEW BOOKS

A Treatise on Dimensioning

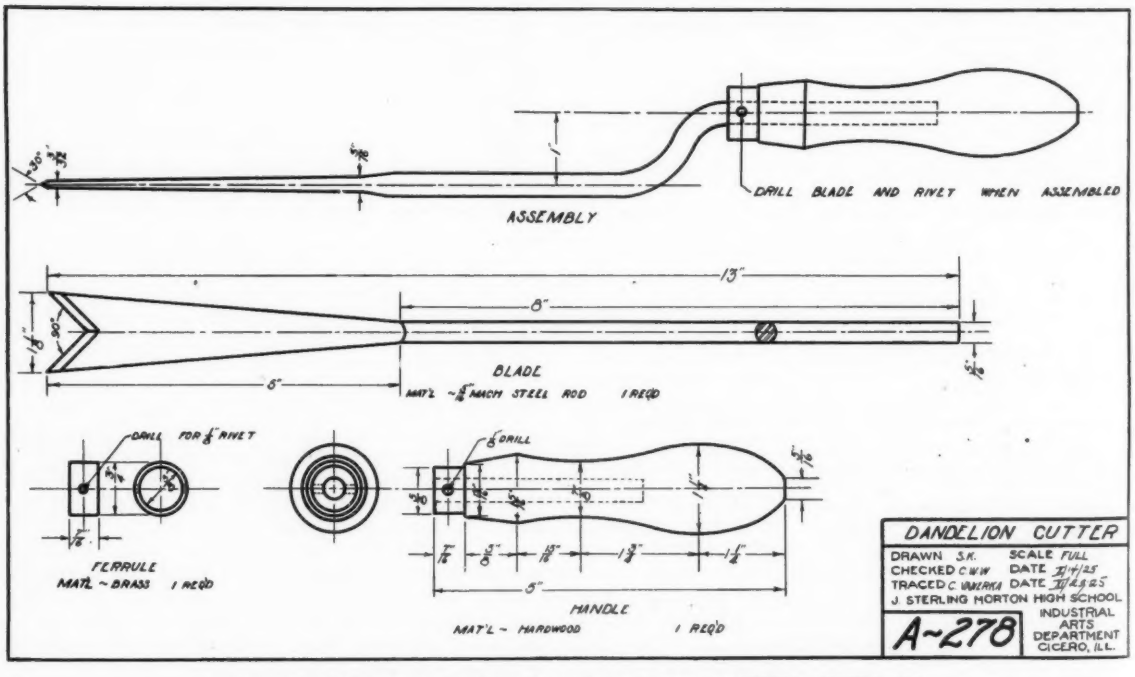
By John F. Faber. Paper, 64 pages. Price, $.68. The Bruce Publishing Company, Milwaukee, Wisconsin.

This interesting book is intended to supplement an introductory course in mechanical drawing and provides both complete information on dimensioning and a series of 41 typical plates involving a graded series of problems for the student to solve. Fifty additional problems are given which the student may redraw and dimension. The book will be useful not only for its original purpose, but also as a source of problems for the introductory mechanical drawing class.

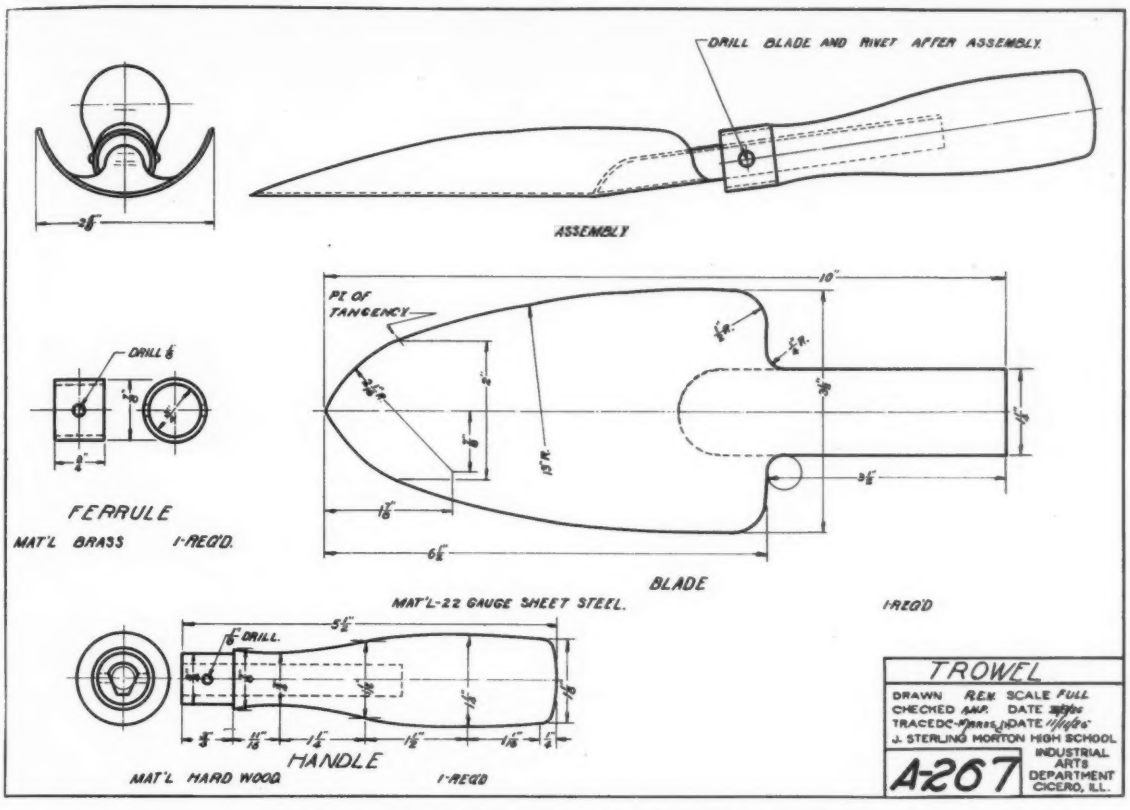
Good Practice in Construction

By Philip G. Knobloch. Boards, quarto, 52 plates. Price, $4. Pencil Points Press, New York, N. Y.

This book presents 52 plates of important and typical problems in building construction. It is interesting to note that the data have been collected from actual buildings planned and constructed by well known architectural firms, who are noted in the profession for careful construction and careful detailing. The present book opens with several plates on house planning, half timber construction, brick veneering, brick construction, and interior wood trim. It includes also a wide variety of material on doorways and vestibules, storm sash, radiator enclosures, ceiling lights, built-in furniture, etc. The book will be found useful for reference in many schools where architectural and building drawing are offered. It will provide a rich source of problems for advanced classes.



DETAILS OF DANDELION CUTTER DESIGNED BY H. D. CAMPBELL, CICERO, ILL.



DETAILS OF TROWEL DESIGNED BY H. D. CAMPBELL, CICERO, ILL.

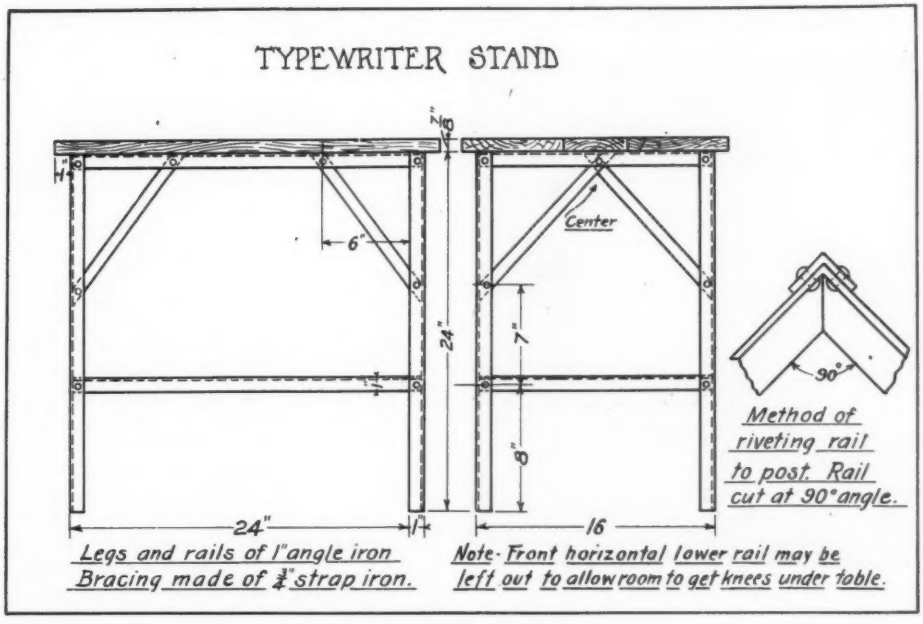
BOSTON SOCIETY VISITS TECHNOLOGY INSTITUTE

Fifty-one members of the Boston Vocational Education Society enjoyed the hospitality of the Massachusetts Institute of Technology on Wednesday, February 24th. The institution is a pioneer in vocational education in the east, even though it teaches the engineering professions rather than the trades. Through its Lowell Institute courses for industrial foremen, it has rendered a direct service to the industries of Boston and vicinity and to the men engaged in them. A number of the Society's members are graduates of the courses.

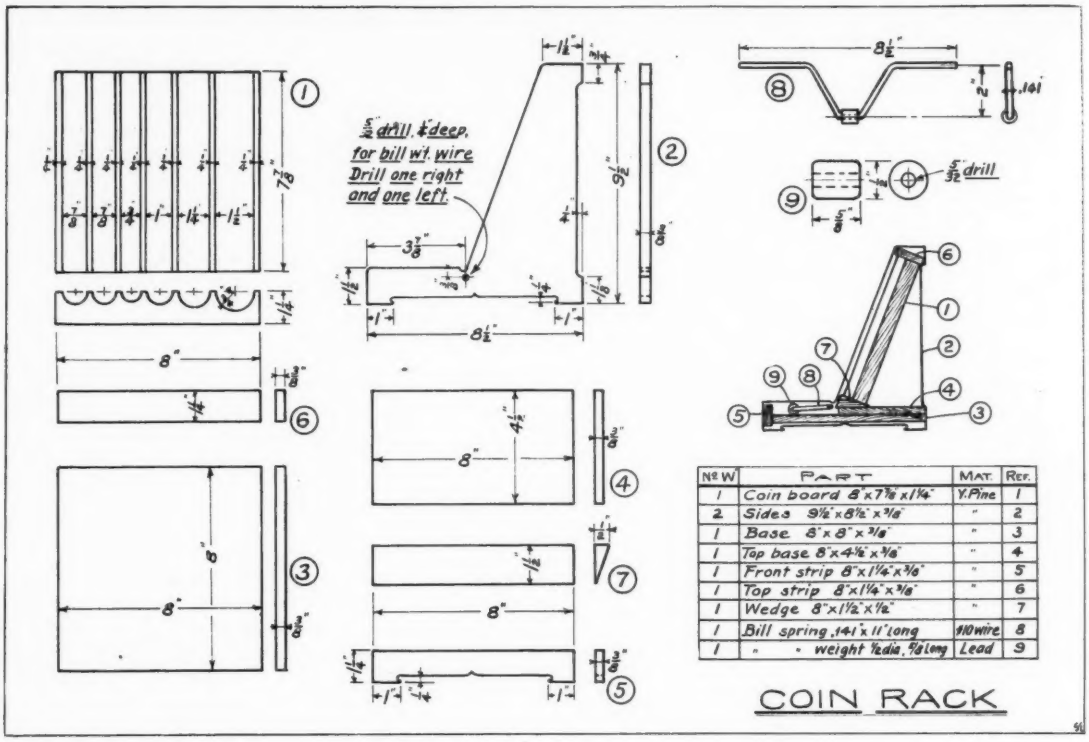
The members gathered at nine-thirty, and started on their tour under the guidance of a member of the Institute's faculty. The main building was not the least impressive of the sights of the day, and laboratories of every kind related to the industries are housed there.

The laboratories are devoted to tests of every item, from textile fabrics to refrigerating mixtures. An x-ray room is equipped with rays of sufficient strength to make photographs of any flaws which may exist in a piece of steel.

A most interesting department was that devoted to naval architecture. Here were gathered hundreds of models and pictures of ships of all types and ages, representing only a small part of those belonging to the Institute. An interesting feature was a group of miniature models, illustrating the development of British naval architecture from the time of King Alfred, down to the present day.



DETAILS OF TYPEWRITER STAND.



No. W	PART	MAT.	REQ.
1	Coin board 8"x7⅞"x1¼"	Y. Pine	1
2	Sides 9½"x8½"x⅜"	"	2
1	Base 8"x8"x⅜"	"	3
1	Top base 8"x4½"x⅜"	"	4
1	Front strip 8"x1¼"x⅜"	"	5
1	Top strip 8"x1¼"x⅜"	"	6
1	Wedge 8"x1½"x½"	"	7
1	Bill spring .141"x11" long	#10 wire	8
1	" weight ½" dia. ⅝" long	Lead	9

DETAILS OF COIN RACK.

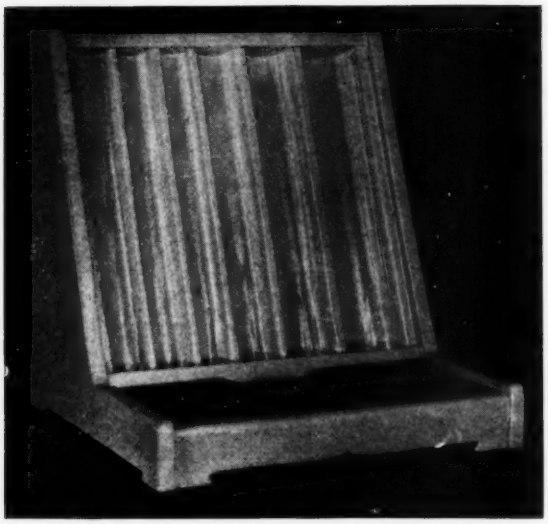
A SCHOOL CAFETERIA PROJECT

C. A. Kunou, Supervisor of Manual Education,
Los Angeles, Calif.

This coin rack was originally planned in cooperation with the Home Economics Department and has been constructed to fill a need in the cafeterias and lunch rooms operated in the local schools.

The accompanying bill of materials indicates the materials used. The side pieces of the coin rack are laid out and contoured as shown in the drawing. The bottom pieces are glued and nailed together, with the grain running in transverse direction. This is done for the purpose of securing strength.

The rack proper is made of vertical grain, soft yellow pine, so as to obtain smooth and even grooves for stacking the coins. The flutes are separated by narrow fillets.



COIN RACK.

The grooves are made with gouges and sanded with blocks, shaped to fit the respective flutes. The flutes may also be planed out with rounds, if such planes are at hand.

The wire for holding the bills is bent over a block of wood, shaped for that purpose. The lead weight is hammered into shape as shown in the drawing, and a hole is drilled through it to fit the spring wire. The holes in the base of the rack, for the ends of the wire, are bored before the rack is assembled. When the rack has been assembled and painted, the wire is bent and inserted in the holes.

The rack is given two undercoats of gray paint, sanded, and then is enameled in French gray or finished in a color to match the furniture of the cafeteria. The enamel is rubbed with pumice stone and water to a velvety mat finish. The spring wire and lead weight are finished with black enamel, mat finish. This finish is applied before inserting the wire.

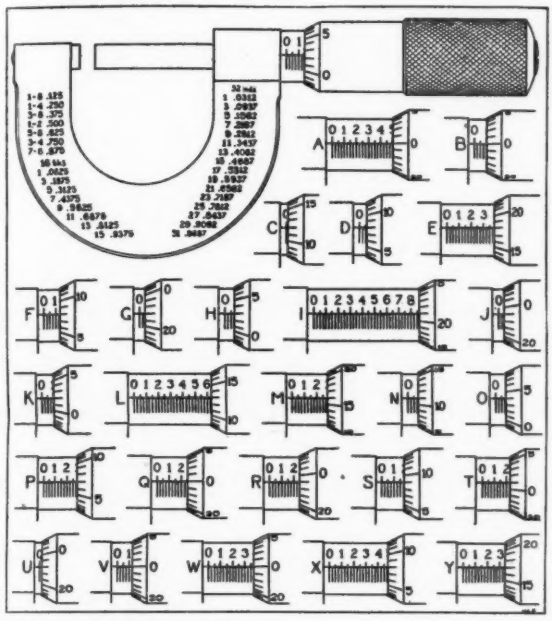
A MICROMETER READING TEST

Wm. L. Hunter, Teachers College, New York, N. Y.

Some difficulty is often encountered by a few members of a class in learning to read a micrometer. Just as there are differences in abilities of various individuals when it comes to a matter of reading a printed page of a book, or of doing any other skill, so are there differences in ability when we consider the problem of reading a micrometer. We can locate these persons who do not readily understand how to read this instrument and at least prevent a few of the mistakes on actual work in the shop. After blackboard instruction or a demonstration has been given in the reading of this tool, a test similar to that shown can be given, papers can be exchanged, the readings verified, and difficulties can be cleared up.

As a still further check we can have as many sets of short rods of different diameters as there are pupils in the class, and also a micrometer for each pupil and thus locate those who are slow and inaccurate in learning to read. This can seldom be done, however, because there are few shops which can afford enough of these instru-

ments to go around. The paper test does nearly all that the other test will do as far as reading is concerned and is not nearly as unwieldy to handle. It is only as a teacher locates and clears up the difficulties of the students that the instruction will be of immediate value.



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Micrometer Reading Test

Directions—Tell how many thousandths of an inch are shown by each of the micrometer readings represented. Write your answers in the proper blanks. No answer is required for the large complete drawing.

A .....thousandths of an inch
B .....thousandths of an inch
C .....thousandths of an inch
D .....thousandths of an inch
E .....thousandths of an inch
F .....thousandths of an inch
G .....thousandths of an inch
H .....thousandths of an inch
I .....thousandths of an inch
J .....thousandths of an inch
K .....thousandths of an inch
L .....thousandths of an inch
M .....thousandths of an inch
N .....thousandths of an inch
O .....thousandths of an inch
P .....thousandths of an inch
Q .....thousandths of an inch
R .....thousandths of an inch
S .....thousandths of an inch
T .....thousandths of an inch
U .....thousandths of an inch
V .....thousandths of an inch
W .....thousandths of an inch
X .....thousandths of an inch
Y .....thousandths of an inch

A GOOD METHOD OF GLUING BRUSHES

Harold Hill, Silver Lake High School, Ayrshire, Iowa

In school shops where brush making has been taken up, considerable difficulty has been experienced in gluing on the back piece after the bristles have been drawn into the block. The back must be clamped securely to insure a tight connection.

The clamp described in this article does the work easily. Two clamps were made, one for a single brush, the other for gluing two brushes at the same time. These eliminate all the trouble of fussing with weights, bench clamps, and other contrivances.

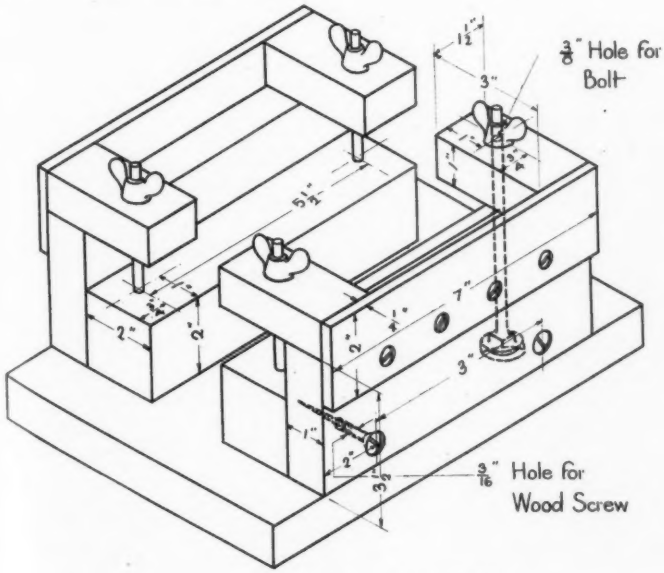
The base of the double clamp should be a piece of ¾" material, 8"x10". This is used as a base on which to mount the clamp. The bottom pieces (1) are 2"x2"x7". A ⅜" hole should be bored ¾" from each end.

Two side strips (2) measure ¼"x2"x7", and are used to help the clamping pieces (3) in place. Four clamping pieces, ¾"x1½"x3", with a ⅜" hole bored one inch from one end and ¾" in from the edge, must be made. The two sides (4), as used in our clamp, are ¾"x3½"x7". Two 5/16" holes are bored about two inches from the end and one-half inch from the bottom edge. These are countersunk for woodscrews.

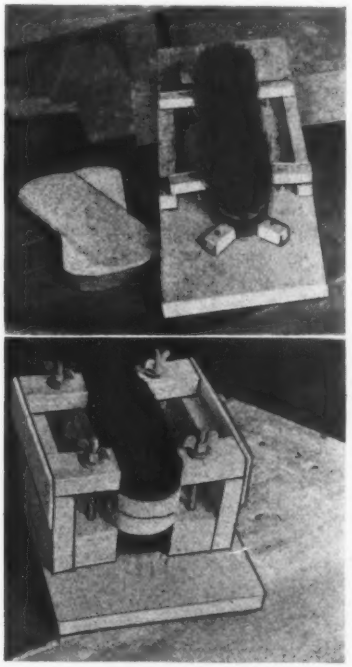
In assembling, the bottom pieces are fastened on far enough apart to allow the bristles to go between, while the edges of the block rest on the bottom pieces. This distance is two inches in our clamp. Two woodscrews through the base hold these in place.

The two sides are next put on, being held in place by two woodscrews screwed into the bottom pieces. The height of these sides should vary according to the thickness of the brushes to be clamped.

Side strips (2) are put on with light nails. They should be nailed to the sides and allowed to extend up one inch. Four holes must now be bored through the base to correspond with the holes in the bottom pieces. A ¼" bolt, 6" long, with a wing nut, is inserted in each hole. The clamping pieces are placed on the bolts, and the clamp is ready for use.



DETAILS OF BRUSH CLAMP.



TWO TYPES OF GLUE CLAMPS IN USE.

The backs on two brushes are glued, put in position on the brush, and the two brushes put in the clamp, back to back. The bristles in the lower brush extend into the space between the bottom pieces and in the top brush they extend upward. The clamping pieces are put in position, the nuts turned down, and the glue is allowed to set. If the brushes are to be used in water, waterproof glue should be used, as common glue is likely to loosen when wet.

LETTER OPENERS OF BRASS AND COPPER

John C. Reynolds, Rochester, New York

Articles of copper and brass offer many opportunities for interesting, valuable, and artistic problems. Many teachers are prevented from using these materials because of the lack of equipment. However, there are many things that may be worked out with a minimum of tools and supplies.

Take for instance the letter openers. Here are the materials and tools needed for cutting out the piece and placing an etched design on it:

Materials	Tools
1 pc. 18 gauge copper 1½"x6½"	Tin shears
Asphaltum varnish	Half-round file
Nitric acid	Round file
Liver of sulphur	Flat file
Emery cloth	Ball-pein hammer
Wax	Acid pan or dish
Turpentine	

Such a problem should be preceded by a carefully worked out lesson in design. Consider the purpose of the letter opener as well as the form and size most convenient for the purpose. To give beauty we must seek a refinement of form by careful space division and the use of harmonious curves and lines in the handle and blade. We cannot ignore the relation of parts to the whole even in as simple a construction as this.

When we have secured a pleasing form, consider an applied design to be etched into the metal with nitric acid. Let this design conform to the general contours of the object. Break the areas up into a variety of forms. Many trials may be needed before the most pleasing result is arrived at. We must always remember that we are trying to secure a unified design.

Mr. Ernest Batchelder says, "The form of an object together with its structural or functional elements should suggest the general character and position of any enrichment that may be developed."

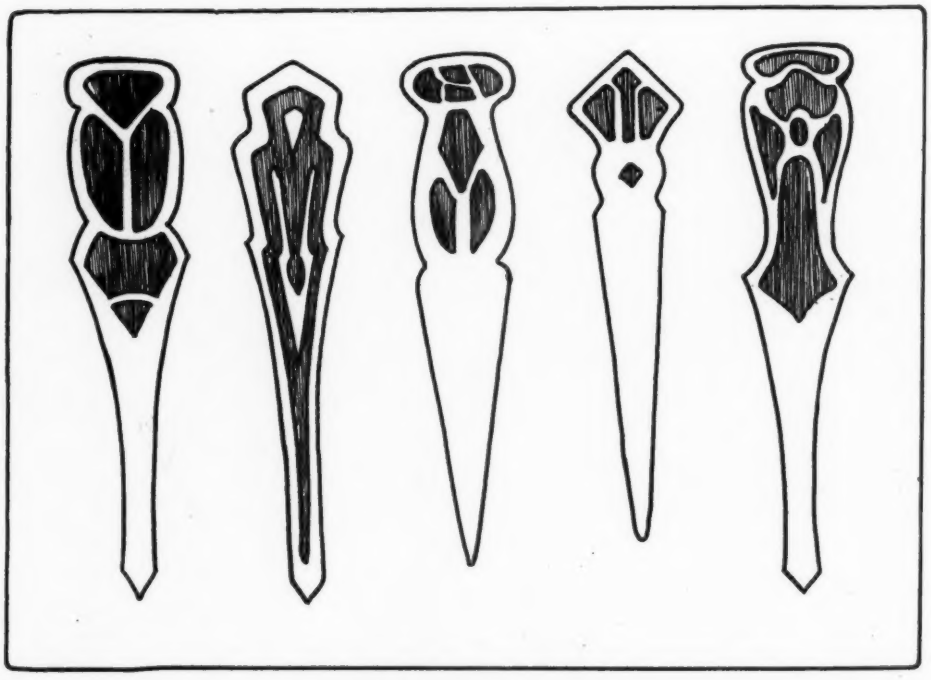
When the design is thoroughly developed, it is traced on the metal with carbon paper. Then cut as near to the lines as possible with tin shears. File to the line, using the file that best fits the form. Paint the entire surface of the metal with asphaltum varnish, leaving out the lines and areas of the design. When the varnish is dry, place a solution of one part nitric acid and two parts water in the pan. There should be enough to cover the metal. Bubbles will rise from the exposed parts of the design. Watch the job carefully to see that the varnish does not peel from the metal. When the acid has eaten the design to a sufficient depth, remove the piece and wash it with clean water. The asphaltum varnish may be removed by using turpentine on a cloth.

Now with the round end of the ball-pein hammer, strike the blade and possibly the outer edges of the handle with light, even strokes. This gives the desired hammered effect. An edge should be filed on the letter opener.

To clean the metal, dip it for a moment in the acid, rinsing off in water.

This piece should have the dark antique finish. Brush on a solution of liver of sulphur which turns the copper dark brown or black. When dry, polish the high parts with fine emery cloth, leaving the dark color in the lower parts of the design. To hold the color and to finish or polish the piece, rub on two or three coats of wax.

This letter opener when well designed, and carefully made, will produce an object of beauty worthy of a place on any desk.



DETAILS OF LETTER OPENERS.

INDUSTRIAL ARTS VOCABULARY

F. S. Crispin, Philadelphia, Pa.

Dimension—A definite measurement shown on a mechanical drawing, as length, width, thickness. Dimensions are given on all working drawings whether drawn to scale or not, but not in shaded and assembly drawings.

Dimension Lines—Lines upon a drawing which indicate to what part or line the dimensions have reference.

Dimensioning—Indicating on a drawing the sizes of various parts.

Direct Current—A current flowing in one direction. In a dynamo the current generated alternates, but it may be converted into direct current by a commutator.

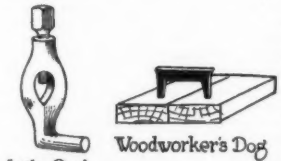
Direction—The position of one point in relation to another.

Disengaging Clutch—A clutch for the throwing of a line of shafting, or a train of wheels, into and out of gear.

Distributed Load—(Arch.) When a load is spread evenly over the whole extent of the surface of a beam or structure it is termed a distributed load. A girder will sustain a distributed load of twice the total weight which it would sustain if concentrated.

Divide—To cut or part into two or more pieces.

Dividers—Compasses for measuring or setting off distances.



Lathe Dog Woodworker's Dog

Dog—One of the jaws of a jaw chuck. The carrier of a lathe. In wood work a small piece of metal with two or more points used for binding pieces of wood together while they are being worked on.

Dolly—A tool used by boiler makers for holding under the heads of rivets while riveting.

Door Check—(Arch.) A device which causes a door to close quietly, without banging.

Door Head—(Arch.) The upper portion of a door frame.

Door Stop—(Arch.) A block placed to prevent a door from striking the wall.

Dormer Windows

Dormer Window—(Arch.) A small window projecting from the slope of a roof.

Doric Order—(Arch.) The oldest of the Grecian orders of architecture — columns fluted, capital and base similar to the Tuscan.

Double Belting—Belting formed of two thicknesses of leather.

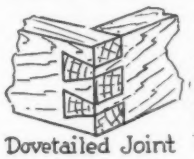
Double-ended Bolt—A bolt having no solid head, being threaded at each end for the reception of nuts. Often called a stud bolt.

Double Geared—A lathe or drilling press provided with the ordinary back gear is said to be double geared.

Double-hung Window—(Arch.) A window consisting of upper and lower sash both carried by sash cord and weights.

Double Riveting—Two lines of rivets in a lap joint or four in a butt joint.

Double Threaded Screw—A screw consisting of two distinct helices, winding parallel with each other around the body. Used to give an increase in the rate of travel. Seldom used in V or U.S.S. threads.



Dovetailed Joint

Dovetail—An interlocking joint used for wood work.

Dowels—Pins either of wood or metal used by pattern makers to retain portions of patterns temporarily in positions during the process of moulding, also used in making permanent joints.

Down Spout—(Arch.) A pipe or conductor for carrying rain water from a roof to the ground or to sewer pipes.

Draftsman—One who prepares drawings or portrays graphically; generally applied to one who uses mechanical aid or instruments in his work.

Drag—The bottom section of a founder's moulding box.

Draught—The tapering or gradual thinning down of the vertical sides of foundry patterns to facilitate removal from the sand.

Drawing—The delineation of machinery and machine parts in plans, elevations, and sections, to proportional scales.

Drawing Dies—Dies used in power presses for pressing sheet metal into cup-like shapes.

Drawing of Patterns—The lifting of foundry patterns from the sand.

Drift—A rectangular strip of steel, wedge shaped, in its length, used for driving keys out of their beds or drill sockets from spindles.

Drill—A tool for boring holes in metal or wood. Drills may be flat toward the point and simply bevelled, or of the twist type.

Drill Chuck—A chuck made especially for holding drills.

(To Be Continued)

A USEFUL ALPHABET DESIGNED BY W. BEN HUNT AND ED HUNT.

ILLINOIS MANUAL ARTS MEETING

The twenty-second annual meeting of the Illinois Manual Arts Association was held Friday and Saturday, February 12th and 13th, at Peoria, Ill., and was attended by 75 teachers and supervisors. The morning was spent by the out-of-town teachers in visiting school shops and the shops of Bradley Institute. A get-together luncheon was served at Bradley following the tour of the shops.

The afternoon meeting was opened by Mr. J. C. Gamback, head of the manual training department in the Peoria high school. Mr. E. C. Fisher, superintendent of schools, gave the address of welcome, and he was followed by Mr. W. D. Castle, of the Joliet Township high school, who talked on "Mechanical Drawing Tests." Mr. Castle displayed charts showing how it is possible to test a boy, to bring out any weaknesses in mechanical drawing. The test should be followed by work tending to help the student in his particular weakness.

Mr. W. L. McDougal, of the Pullman School of Manual Training, Pullman, Ill., gave an interesting talk on "Electrical Work for High Schools." He showed how electrical work can be related to mathematics and drawing and pointed out that any electrical course must contain as a basis electrical circuits and house wiring.

Mr. Anthony LaFauce, of Springfield, discussed "Woodwork, Printing and Shoe Cobbling in the Same Shop." The advantages of a general grade shop were shown in localities similar to his, where 27 per cent of the students are colored, and the remaining 73 per cent are mixed nationalities. The expense of equipment is kept down since there is no duplication of tools and supplies may be obtained from the five-and-ten-cent stores. The students take care of their shoes and repair shoes, and the shop renders a real service to the community. An effective checking system for tools has been devised with the result that no tools have been lost in a six-year period.

At the evening program Supt. Fisher of Peoria introduced the toastmaster, Mr. L. W. Wahlstrom of the Parker High School, Chicago. Mr. Wahlstrom pointed out that school people should not be afraid to discontinue present methods where rapidly changing conditions call for such a change.

Dr. Hamilton, president of Bradley Institute, diagnosed the troubles of the manual arts and prescribed a cure. He argued that manual arts teachers need a common aim and pointed out that they should be ready to make changes where conditions change, being sure, however, that the change will effect a needed improvement. He gave his views on the objections to manual arts and urged a sympathetic attitude toward physical labor. He emphasized that the teacher should have the right to construct his own curriculum, being careful to be liberal toward other subjects in the course, and to limit the period of technical training.

Prof. Arthur B. Mays, of the University of Illinois, took for his topic, "Changing Relations Between the Manual Arts and Vocational Training." He showed that formal discipline has its place in the common school, but that technical training should be given in private schools, and gave examples illustrating that there has always been vocational training in manual arts. He pointed out that the Smith-Hughes influence has offered better manual training equipment and has implanted it deeper into the school systems of the country. He showed how manual arts men have gone into administrative positions and other fields, while many more have entered the manual arts field from the liberal arts simply because there are more of them. Mr. Mays showed that the basic fundamentals of trade training are the same and argued that it would be better to offer one year of general manual training and then to offer specialization.

Dr. Charles A. Bennett, of Peoria, gave a review of the first manual arts meeting and of the work of the organization since that time, closing with the question of affiliation of the Association with the American Vocational Association.

Mr. Albert F. Siepert, of Bradley Institute, spoke on the live subject of "Selecting Projects—When and How." He pointed out that any course needs new projects if it is to be a live subject. Everything is constantly changing—occupations, transportation, and mode of living, so we must change if we are to progress. Mr. Siepert emphasized that courses of study are based on tradition, imitation, or frequency of use, and gave illustrations to prove his point. He urged the analysis of each project to see what is back of it, and to spend some time in teaching repair of factory-made articles, illustrating the point that there are more men employed in keeping Ford cars running than in making them at the factory.

The Saturday morning meeting was in charge of Mr. J. C. Gamback. Mr. J. F. Kolb, state supervisor of industrial education at Springfield, gave some suggestions for shop teachers. He advocated a better and more detailed course of study with lesson plans, and pointed out that teachers may expect a better class of shop students through the changing attitude of academic teachers. He urged membership in clubs and other organizations where shop teachers may become acquainted with the leaders of the community and stressed more service and better salesmanship.

Mr. W. R. Baker, of the Waukegan Township secondary schools, showed the adaptability of printing in schools because of the coordination with English departments. The educational value of printshop productive work is illustrated in the school papers and annuals and these help in acquiring a knowledge of printing, as well as in developing an appreciation of good organization.

Mr. Fred E. Dace, of Bradley Institute, who followed, spoke on "How Far Can One Go with Radio in the High School?" "Radio," said Mr. Dace, "is the greatest scientific fact in the world today and it has reduced space and time to almost nothing. To teach radio the instructor must be especially well trained because of expert knowledge boys already have." He believes that radio can contribute as much as any other subject in an educational way, and that teachers may go the limit as far as time and equipment permit. He believes the construction of sets by the pupils is the most satisfactory method of instruction. In cooperation with other departments, the panel layout may be made in the drawing room, drilled in the machine shop, and the cabinet made in the wood shop. The instructor's wider knowledge of the work should enable him to recommend reliable parts.

The Association in lieu of permanent officers, elected a committee of five representatives, consisting of C. A. Bennett, A. G. Bauersfeld, J. F. Kolb, A. B. McCall, and A. B. Mays to draw up a resolution looking toward affiliation with the national body on vocational education.—**F. L. Barloga.**

THE INDUSTRIAL ARTS ROUND TABLE

The February meeting of the Industrial Arts Round Table of Chicago was held on the nineteenth, at the plant of R. R. Donnelly & Sons Company, in the rooms of the training department. Mr. E. E. Sheldon, the chairman, was in charge of the training department and had on display some fine examples of the printer's art. Among these were examples of foreign publications, as well as exhibits of the work done in the local plant. Beautiful posters lined the walls, advertising various utilities in this country and Europe. Another section was devoted to examples of lettering done by the boys in the training section of the plant. Samples of the color work done in the building were presented to each visitor.

The speaker of the evening was Mr. Raymond P. Ensign, dean of the School of the Art Institute, Chicago, who took for his topic, "Design Applied to the Industrial Arts." "It is not difficult in such a room as this," said Mr. Ensign, "to know what art is and what design is. It is a happy day when art is expressed in other forms than painting and sculpture. Many new fields have been opened up, such as costume design—a field which begins with cutting and then follows through the big principles in design." Mr. Ensign illustrated various design principles, for instance, that a mechanical reproduction of a natural thing need not be limited to a fixed point with a fixed radius. Again, the circular posts in the room are round from reasons of mechanics and economy but they may be equally serviceable if interesting curves are applied such as are seen in classic architecture. The flower may be round in one view, but in the other view shows moving, freely changing curves. By observation and comparison ideas of change, freedom, order and the control of balance make possible a different design, tending toward lightness.

Mr. Ensign pointed out that today we have opportunity to apply design to many things. The design consciousness touches clothing and home furnishings. Begin with the things nearest you. Doors, plates, grills, etc., are beautiful examples which may be seen on many public buildings. He went on to analyze the costs in a lamp and showed by comparison that the spiritual forces in the lamp accounts for the greatest factor in the cost. Here, too, art is equally an opportunity to stop when the motive is satisfied.

The present problem is that of combining an understanding of construction with principles of beauty, according to Mr. Ensign. The merchant who would hire a trained personnel cannot get what he wants from us. The folks in front of the counter need education as to the proper combination of material, design and finish and there is increased coordination between the jobber, the assembler and the manufacturer back of the merchant.

Mr. A. DeLauty, formerly of the London School of Arts and Crafts, displayed several bound volumes from his department and mentioned that the cost of binding one of the volumes was nearly a thousand dollars because of the time and material put into the design. Mr. DeLauty emphasized that fitness for use must be the determining factor in design and that ornament is too often overemphasized when it should be restrained. The important thing for both worker and designer is to appreciate the limitations of handwork and to allow mechanical perfection to take precedence over the ornament.

The next meeting of the round table will be held March 26th, at the Francis Parker School, under the leadership of Mr. L. W. Wahlstrom. The subject of the meeting will be "Books, Pictures, and Modern Aids to the Shop Teacher."—**Robert B. Bagby.**

NEW JERSEY VOCATIONAL ASSOCIATION WILL HOLD TENTH ANNUAL MEETING

The New Jersey Vocational and Arts Association will hold its tenth annual meeting at Paterson, on Friday and Saturday, March 19th and 20th. Headquarters of the association will be at the Alexander Hamilton Hotel.

The local committee on arrangements has arranged a number of visiting trips to some of the leading industrial plants of the city, and opportunity will be given for visits to the schools.

At the general meeting on Friday, Mrs. Lucinda Prince will talk on "Selling Your Job." At the vocational training section, Mr. James Mason, of Paterson, will give an address on "A Voca

tional School Curriculum", Mr. Martin Corcoran, Elizabeth, N. J., will talk on "Advantages of Production in the Shop," and Mr. Harry Severn, West Orange, N. J., will discuss "Coordination of Related Subjects to Production." At the section on training for girls, Mrs. Maude Swartz will take for her subject, "Compensation in Industry."

At the supervisors' section, Mr. Wesley O'Leary, assistant state commissioner of education, will talk on "Today's Objectives in Manual Arts and Vocational Education"; Mr. E. A. Reuther will discuss "Some Things a Supervisor Observes," and Mr. W. R. Ward, Trenton, will take for his topic, "The Problem of Supervision as a City Supervisor Sees It."

A number of other sectional meetings will be held, including the subnormal department, the printing section, the manual training section, the household arts section, the continuation school section, and the art section.

MECHANIC ARTS TEACHERS MEET IN PHILADELPHIA

A larger membership and an increased enthusiasm for industrial education in Philadelphia are assured with the merging of the former elementary and junior high school shop teachers' body with the Mechanic Arts Teachers' Association. The union was effected at a meeting on January 14th and attended by 125 instructors.

Mr. William W. Farley, chairman of the meeting, gave a few remarks. The first speaker was Mr. R. F. Carey, supervisor of education of the Westinghouse Electric and Mfg. Company of Philadelphia. Speaking on the subject, "The Importance of Vocational Education to Industry," Mr. Farley pointed out that there is a movement to have the educational and industrial powers united for the public good. He showed that there is an urgent need for vocational education throughout the nation, indicated by the fact that America needs 750,000 apprentices and only 144,000 are to be counted on. A higher type of mechanic is required these days due to specialization. Statistics show that there is one executive for every thirteen wage-earners, and that leads to the idea that executives must be trained.

Mr. Charles F. Bauder, director of industrial arts education in Philadelphia, traced the origin of the shop teachers' association and the mechanic arts association, and pointed out the value to be derived from the union of these organizations. He pointed out the need for leaders and that the organization offers an opportunity for those who possess the ability to lead.

Mr. Bauder outlined the work being done by the National Society for Vocational Education and spoke of what had been accomplished between the Metal Workers' Association and the school authorities, giving full credit to Mr. Frank R. Robinson, of the Central High School, for his work.

Mr. A. B. Entwisle, of the West Philadelphia High School for Boys, expressed his approval of the union of the associations and briefly told of the things accomplished during his lifetime. Being a strong believer in the mechanic arts and vocational education, he deplored the fact that boys are unduly urged to take up vocational work regardless of their interests and aptitudes. He urged that they be advised of the possibilities in certain trades and that the choice of an occupation be left to the boy and his parens.

Mr. W. N. Miller, of the South Philadelphia high school for boys, reminded the men present of the common objective and of the fact that the entire strength of the teachers is needed to carry out the reform movements at the present time. He urged that boys be given advice on trade subjects but cautioned the teachers not to urge boys in choosing an occupation.

Mr. Frank R. Robinson, of Central High School, gave a report of his trip through the Middle West and spoke of the many things he had picked up on the trip. He pointed out that success in industrial education depends upon the cooperation between industry and the schools. At the present time there is close cooperation between the industrial groups and the schools of Philadelphia. While there is great need for young workers to enter the various industries, boys not fitted should not be urged to take up industrial training in school shops.

President Farley outlined the activities of the association and praised the enthusiasm with which the industrial teachers had grasped the opportunity to join hands in the work of the association.

The association will hold a business meeting in October, 1926, at which time officers will be elected.—**Frank S. Henry.**

THE VOCATIONAL SOCIETY OF BOSTON MEETS

The February meeting of the Vocational Education Society of Boston was held at Cook's restaurant, on Saturday, February 13th. The Society voted in five new members: L. J. Nutting, C. G. Engborg, C. A. Driscoll, W. F. Wall, and R. V. Barry. In response to a request of the President, Mr. Wall gave an interesting account of the meeting and of the exhibits at the recent convention of the Master House Painters and Decorators in Philadelphia. Boston was represented by exhibits from the Trade School and the Irving Intermediate School. Mr. Wall paid tribute to Mr. N. P. Barker, a member of the Society, for the work of his boys in the Washington Irving School, a type of work achieved with grammar grade boys, which would do credit to a trade school.

The principal speaker was Mr. W. C. Adams, who took for his topic, "The Relation of the School to the Modern Industrial Plant." Mr. Adams, who is superintendent of the wrench department of the Walworth Manufacturing Company, was formerly a member of the Society and a teacher in the high school. Mr. Adams pointed out that our nation is a nation of workers and that over fifty per cent of the population is gainfully employed; that this is an age of machines and that a majority of those gainfully employed are engaged in mechanical production of one kind or another.

Quantity production brings certain consequences in its train. It means large markets, which in turn involve low costs. Low costs stimulate demand, and thus the circle is completed. Employment climbs with the demand, rather than subsiding with mechanical production. Mechanical mass production makes consumers of all producers and Henry Ford employs over one hundred thousand men in his various plants.

One of the greatest benefits of mass production, said Mr. Adams, is apparent in the low-cost reading which is so characteristic of modern life. Where the early Fifteenth Century presses were able to turn out only a few dozen impressions of a small form in an hour, a modern press will manufacture hundreds of thousands in the same length of time. Again, the benefits which agriculture has reaped from mechanical production are indicated in the fact that in 1800, 97 per cent of the people were needed in farm occupations, while today less than twenty per cent are able to fill the demand for farm products, thus releasing millions of men for industry.

Mr. Adams pointed out that the boys are being educated for places in industry whether or not the teachers and the curricula recognize the fact, and it is in industry that a large majority of them will find their lifework. He divided the industrial workers into two classes, the creative and the non-creative. The latter—always the more numerous class—do the routine work. There is, however, no reason for a creative man to stay in a routine job, since the demand for his type of ability is greater than the supply. Every manufacturer is on the lookout for foremanship material. The Walworth Company, in an attempt to cultivate such material, has minor supervisors called "group tenders" between the workers and the foremen. The group tender is given some executive responsibility and he is given opportunity for broadened experiences which enlarge his capacity and training in the direction of advancement. It was emphasized that the selection and training of the foreman type of workman is a larger problem in industry than the finding of routine workers, since the larger number of persons will be satisfied with the common type of job.

Mr. Adams emphasized that the type of young man needed for training in executive work is the well-prepared young student direct from a high school or trade school—the boy who gets at the fundamentals and makes them his own as he goes along, and who is likely to grasp the fundamentals of industry and to lay the foundation for advancement beyond the routine ranks.

The trade school, said Mr. Adams, has a particularly good opportunity for offering this valuable training. In addition to cultivating powers of observation, it can give the pupils much specific knowledge and skill which will save time in the upward progress through the ranks of industry. It discourages the idea of the "white collar" job which is likely to be a real handicap; it aims to impress upon the boy the idea that he must start at the bottom in industry and that he will advance just as rapidly as he demonstrates ability and skill.—**Frederick Ames Coates.**

FEBRUARY MEETING OF THE SCHOOL CRAFTS CLUB

Lloyd F. Stair

The School Crafts Club of New York City held a regular dinner meeting at 6:15 p. m., February 20, 1926, at the Geneva Restaurant, 143 West 44th St. For the March meeting the club has accepted an invitation to attend in a body the New Jersey Vocational and Arts Association Convention to be held in Paterson on March 19 and 20.

The following manual arts teachers were accepted unanimously as members: Joseph E. Wallace, Paterson, N. J.; Stanley E. Griffith, Paterson, N. J.; William C. Haues, Hoboken, N. J.; F. Stanley Vehslage, East Orange, N. J.; John Van Haste, Paterson, N. J.; Charles Glasser, Long Island City, N. Y., and F. C. Van Eos, New York City.

Due to illness, Mr. J. G. Spofford, of the New Jersey Department of Vocational Education, was unable to deliver a talk on teacher training as scheduled. Mr. L. A. Emerson, principal of the Newark Vocational School, had for his topic, "The Place of the Vocational School in the Educational Field." Mr. Emerson began his remarks by giving an instance of how former School Crafts Club members are instrumental in starting other clubs of like aims. He has been a member of the Chicago Industrial Arts Round Table which had some of our own club men as a nucleus. When he came east he was urged to affiliate himself with the older organization.

Mr. Emerson related how vocational education dates back to the guilds and old apprenticeship ideas. It is only in the last forty years that endowed vocational schools came into being. These paved the way for the development of state vocational educational programs and the enactment of the Smith-Hughes bill in 1917, when the real growth began.

Vocational education is not confined to public schools; many industrial companies are carrying on splendid programs. Practical arts has its place in the educational field with a purpose quite different than that of vocational training. However, much confusion exists in many minds as to the aims of the two factions. Mr. Emerson went from practical arts teaching to industry, and thence to vocational training work. He confesses that

he thought for a time that practical arts was a thing of the past. He later concluded that this idea was false, as each has its field. One cause of confusion is that each uses the same materials, supplies, tools, and equipment. Teachers are coming into the field without a clear idea of where they are going. Objectives and aims are not sharply defined. It is well to stop and think; it is not the equipment which signifies the objectives.

Boys today do not have the opportunity to get an insight into industry as fifty years ago. Then a simpler order reigned, the village blacksmith shop was industry enthroned with its doors wide open to the observation of youth. Today complexity has put industry behind closed doors, so to speak. Here then we have an aim for practical arts, to unfold to the young minds the wonders of our great industrial system.

Other aims which practical arts should strive for are vocational guidance, nourishing of the creative spirit, education for life, and ability to adaptation through broad understanding.

The aim of vocational education is something else. It is an "earn one's living" proposition, a getting ready for a specified branch of industry, or extensive work in evening or part time schools in the trade the youth is already working at.

Vocational education is a part of the general scheme of education. Academic men are now using the term as though it meant something. In the Joliet township high school, vocational education is incorporated in the curriculum. A boy taking this work has a chance to take part in athletics and other school activities. Mr. Emerson predicts that eventually all school systems will have some vocational courses. He also hopes for a closer relationship between the school, industry, and the labor groups. Labor organizations already have educational programs. All branches of education should work towards one big program.

Mr. John Honan, shop instructor, Madison Junior High School, Newark, N. J., had for his topic, "A Junior High School Project." Mr. Honan passed out blue prints showing the working plan for a Priscilla Sewing Cabinet. Boys in Mr. Honan's classes are constructing this problem without the use of power machinery. In order to make the demonstration to the Club as clear as possible, Mr. Honan brought with him models of all the pieces required. This is a problem which is very easy to dispose of when completed, as the girls in the domestic science classes are anxious to get hold of them.

Mr. David Petrie, manual training instructor at Paterson, N. J., spoke upon, "What Benefits a Teacher of Industrial Arts Receives from State and Other Organizations." Mr. Petrie feels that instruction formerly given in trade unions to apprentices had a great deal to do toward the development of vocational education as we know it today. In this way the trade unions have helped the schools. Political organizations also have worked for the benefit of the teacher.

Mr. Arthur Feuerstein of the Rogers School, Stamford, Conn., brought with him a splendid exhibit of charts to be used as instruction material in manual arts. These are an aid to pupils in visualizing lesson material. He had industrial charts on abrasives, asbestos, hacksaws, cookie cutter, stucco, dull and sharp plane knives, careless tool handling, soldering, and copper manufacture. Each week Mr. Feuerstein gets out a bulletin dealing with shop atmosphere, organization, honor roll, and new projects.

Mr. Ernest Tuttle, supervisor of industrial arts in East Orange, N. J., brought with him a small boat, which is used as a sixth grade problem. This is sawed out from scrap wood in the high school shop.

THE WESTERN ARTS PROGRAM

The tentative program has been announced for the joint session of the Western Arts Association and the Vocational Education Association of the Middle West, to be held March 16th to 20th, at the Hotel Fort Des Moines, Des Moines, Ia.

Mr. Royal B. Farnum, of Massachusetts, will be one of the speakers, and a report of the work accomplished by the Federated Council on Art Education will be a feature of the meeting.

The railroads have granted special rates of one and one-half fare for those attending the convention.

The exhibits, it is expected, will be the most comprehensive gathered at any meeting of the organization and an inspection of the display will show the latest in the way of tools, supplies and equipment for industrial arts and vocational education.

At the morning session on March 17th, Miss Harriet M. Cantrall, president of the Western Arts Association, will preside. Mr. A. G. Pelican, of Milwaukee, will talk on "Stimulating Interest by Means of Demonstration Drawing," and Mr. Paul E. Cox, of Ames, Ia., will talk on "The Potter's Part in Art Pottery." On Wednesday evening Dr. F. B. Knight, of Iowa City, will give an address on "The Psychology of Half-Success"; Mr. John W. Studebaker, superintendent of schools at Des Moines, will talk on "When Dreams Come True," and Mr. Carl Werntz, of Chicago, will take for his subject, "Art Starting in a New Direction;" Mr. Rodney Brandon, Moosehart, Ill., will discuss "America's Underprivileged Children;" Mr. Lewis Gustafson, of the Ranken Junior School of Mechanical Trades, St. Louis, will talk on "Proposed Amalgamation of Vocational Organizations;" Miss Ruth Mary Weeks, Kansas City, Mo., will discuss "Looking Ahead."

At the Friday afternoon session, Mr. Royal B. Farnum will talk on "The Practical Values of Art." Mr. Holmes Smith of St. Louis will discuss "The Inalienable Right of Every Man, Woman, and Child to Life, Liberty and the Pursuit of Art." and Mr. Charles A. Prosser of Minneapolis will take for his subject, "The Pedagogy of Vocational Education."

On Saturday Mr. Wm. B. Owen, of Chicago, will talk on "Art as Communication;" Mr. Harry E. Wood, of Indianapolis, will discuss "The Most Important Person in the World," and Mr. Cuthbert Lee will talk on "Cooperation in the Educational Program of the American Federation of Art."

At the vocational education session on Saturday morning, Mr. Edwin A. Lee will talk on "The Future of the American Vocational Association," and Mr. S. C. Sonnichsen, of Des Moines, will discuss "Agricultural Education and National Well-Being," and Mr. Charles A. Prosser, of Minneapolis, will talk on "The Use of Tests in Industrial Education."

There will be sectional meetings on agriculture, apprentice training, commercial education, home economics education, industrial education, and vocational guidance.

The most important business of the Vocational Education Association of the Middle West is the consideration of the proposal to discontinue independent existence and to reorganize as a sectional part of the American Vocation Association.

INDUSTRIAL EDUCATION TEACHERS OF OKLAHOMA MEET

The Industrial Education Division of the Oklahoma Education Association held their annual meeting February 11th, 12th, and 13th, at Oklahoma City, in connection with the Oklahoma Education Association. Officers for the next year were elected as follows: Prsident, Dr. W. T. Bawden, Tulsa, Okla.; Vice-President, F. L. Coates, Ponca City; Secretary-Treasurer, R. C. Bowman, Okmulgee; Councilmen, N. A. Lago, Oklahoma City, and W. E. Phillips, Weatherford.

VOCATIONAL EDUCATION MEETING AT THE DEPARTMENT OF SUPERINTENDENCE

The beautiful assembly hall of the American Red Cross was the scene of two meetings of the Department of Vocational Education of the National Education Association during the recent convention of the Department of Superintendence. The meetings, which were held on February 23rd and 24th, respectively, were attended by groups which comfortably filled the room. They gave evidence, however, that if vocational education is to be properly considered, it must for some years to come have separate organizations which hold separate meetings. The superintendents of the country are still too little interested in the subject to give it the attention which it deserves.

The first meeting was opened by a paper descriptive of the development of a vocational education program in the industrial centers of Baltimore. The author was Persis Miller, principal of the Francis Scott Key School, under whose direction the program is being developed.

Professor Thomas Diamond, of the University of Michigan, spoke on the training of foremen which he argued is an integral part of the program for vocational education. "The success of any plan for apprenticeship training, cooperative training, vocational guidance or part-time education depends almost entirely upon the willingness to cooperate of the people with whom the workers come in contact. This is particularly true in regard to the foreman, the man to whom the workers report directly, and upon whose aid and advice the director of vocational education depends.

"A full measure of success for any program is possible only through the active cooperation of the foreman, and since the foreman desires and needs training, therefore, as a matter of duty and policy, as well the training of foreman should be made a definite part of any vocational education program."

Mr. M. M. Proffitt, of the United States Bureau of Education, discussed the subject relating foreman training programs to the program of vocational education in a city school system. He showed how foremanship conferences have four distinctly valuable aspects in any comprehensive scheme.

The Wednesday Program

Mr. Harry B. Wilson, superintendent of schools at Berkeley, Calif., opened the program on Wednesday afternoon with a valuable paper on vocational guidance and the industrial arts program of a city school system. He discussed first, the place and function of industrial arts and vocational guidance in a city school system and then showed by reference to the practice of the Berkeley schools what methods can be successfully employed to develop a successful program. He described in detail the qualifications of teachers and their attitude toward their twofold work of teaching shop subjects and of acting as vocational advisors.

The final paper of the evening was a well rounded discussion of the essential differences of vocational education and industrial arts education programs. The speaker was Mr. J. C. Wright, director of the Federal Board for Vocational Education. Mr. Wright compared the objectives and methods of the two types of work and indicated their especial values as well as difficulties. He laid down ten fundamental principles which must be observed in evaluating an effective vocational program.

1. Instruction in order to be effective with vocational students must be given to **selected groups.**

2. The **subject matter** to be taught must be such as directly **functions in the work** for which the pupil is being **trained.**

3. **Instructors** must have been occupationally **trained** in the trade or **occupation** they are to teach.

4. **Individual instruction** should be given whenever necessary to the progress of any member of the group.

5. Each **individual** member of the group should be permitted to progress as rapidly as his or her ability will permit and pro-

OFFICERS OF NATIONAL VOCATIONAL GUIDANCE ASSOCIATION.

motions should be made at any time on the basis of ability to do the work required.

6. Effective **training** for work can best be given on a **real job.**

7. All **subject matter** and training should be arranged in the most effective instructional **order of difficulty.**

8. The pupil while being trained should be placed in an **occupational atmosphere** and environment.

9. The instruction and training should be based upon **prevailing occupational standards.**

10. **Repetitive training** in the various operations should be given such as will enable the learner to begin work as an economic asset rather than as an economic liability to his employer.

Mr. Howard L. Briggs of Cleveland, Ohio, described in detail the program for vocational training which is being developed under the direction of the Cleveland schools. He contrasted the methods employed in training men for the automotive and metal working industries in which apprentices must acquire a fund of information and a considerable amount of skill before they can be put at productive work. As compared with these industries, boys who enter the building trades can do productive work in some form or other within a week or two after they have been indentured. To meet these two situations, radically different types of vocational courses have been established in Cleveland. In the automotive and machine industries the boys spend a full year in the school before they enter the shop. During the second year they spend alternate weeks in the school and in the shop, and during the third and fourth years they spend only four hours weekly in the school. In the building trades the boys are sent to work immediately and attend school four hours each week during the four years of their apprenticeship.

"In the Cleveland schools we are training practically every building trades apprentice in the community four hours per week during working time. The contractors are so well satisfied with the results that they are paying the boy his full salary for his entire period of school attendance, an annual cost of over $150,000. This means that in four hours' time we must of necessity really increase the industrial efficiency of the pupil under our instruction.

"For every trade there is an advisory committee. 'When in Rome we must do as the Romans do.' Our metal and automobile trades in Cleveland are organized upon an open shop basis. We, therefore, have advisory apprenticeship committees made up of employers and employment managers. In the building trades the condition is strictly closed shop and we, therefore, have contractors and representatives of the local unions to assist in setting up a guaranteed system of apprenticeship through which the boy may be continuously employed. We have experienced splendid cooperation from all groups concerned.

"Our job is to function one hundred per cent in improving the working efficiency and citizenship of the workers in our community.

"Annual graduations are held and journeymanship in our community is recognized only after the boy can present credentials to the committee, certifying that he has served satisfactorily his entire trade apprenticeship and that he has completed the course in training established by the public schools."

THE VOCATIONAL GUIDANCE CONVENTION

The National Vocational Guidance Association held its annual conference on February 18th, 19th, and 20th, at Washington, D. C. The meetings were held in the Hotel Washington and were attended by a larger group than in any previous year. On Thursday the Yearbook devoted to the topic, "A Counsellor in Education and Vocational Guidance," was reviewed under the chairmanship of Prof. A. H. Edgerton of the University of Wisconsin. Among the speakers were Prof. Harry D. Kitson of Columbia University, and Dr. C. R. Mann of Washington. On Friday morning the Association dissolved itself into sections for the discussion of problems related to occupational information and tests and measurements. The evening session was a joint meeting with the National Committee of the Bureau of Occupation, and took up the topic of placement. At the annual dinner on Friday evening, Supt. F. W. Ballou and Miss Grace Abbott were the chief guests of honor and speakers.

Personnel service was discussed on Saturday morning and the Saturday evening session took the form of a joint meeting with the National Association of Secondary School Principals.

Dr. W. Carson Ryan of Swarthmore, Pa., was elected president for the ensuing year.

INDUSTRIAL TEACHERS OF BALTIMORE MEET

The monthly meeting of the Industrial Teachers' Club of Baltimore was held January 15th, in the administration building annex, where a display of industrial arts and vocational education materials produced by the Baltimore schools was shown.

The first speaker was Dr. John L. Stenquist, who spoke on the benefits of the industrial exhibit. In part, he said: "It is very evident that it is a useful device to educate ourselves and to show what others are doing to tell the public what is being done. Its main importance is to show a connected story underlying the whole theory of industrial arts and vocational education. We should keep on improving the exhibit all the time, keeping in mind the main idea. It is an opportunity to do more than to merely catch the eye."

The next speaker was Miss Lola Corbett, who spoke on "The Use and Purpose of the Vocational Guidance Cards." She told of the many and various cards in use, from the first pupil's record to the present vocational counsellor's cards.

Mr. Charles W. Sylvester, director of vocational education, speaking on the exhibit, said: "It means a lot. It tells a story and it should be renewed and new panels put up. The exhibit should be in a permanent place where it will say to the parents of students, 'this is the thing and this is the purpose for which the schools are working.'"

Mr. George M. Gaither, supervisor of industrial education, declared the exhibit showed that someone is working. He asked the members to consider the advantages to themselves in getting up the exhibit. He suggested that the members consider a proposal to send the exhibit to schools in various parts of the city for a certain period of time.

The exhibit of industrial arts and vocational material was arranged for the state teachers' meeting.

Mr. Harold F. Fuller, principal of the Boys' Vocational School at Newark, N. J., has announced his resignation. Mr. Fuller entered the vocational school as a teacher in September, 1915, and was principal at the time the school was taken over by the county.

Exhibit Room in Each New Building. The school board of Chicago has made plans for the inclusion of a room for exhibits of works of art in each new building to be erected in the future. A study of art galleries is being made at the present time in preparation for the establishment of the first exhibit room.

Drawing Teachers Ask Increase in Salary. An increase in the salary maximum of drawing teachers in the schools of Schenectady, N. Y., from $2,000 to $2,500 has been urged by the supervisor of drawing, Miss Grace Knox. The increase is asked on the basis that the work of the drawing teacher is far more exhaustive than that of the regular teacher, and that the instruction requires more special training and preparation.

NOW, ARE THERE ANY QUESTIONS?

The Nib on Hand Saws

Q. 560. Why is there and for what use is the small nib often seen on the part of a hand saw?—F. K. F.

A. "Here at Disston's, we consider a day lost when our mail does not bring us at least one question regarding the small nib that is on the back of Disston straight back saws.

"We have heard many reasons advanced in explanation of this small projection. We have heard, for example, that there was a time when carpenters used this as a sight back in the days when they sighted their work to get a straight line. We have heard, too, that there was a time when saws were tied into a tool box with cord and this nib provided something to fasten the cord to.

"As far as we know, there is nothing to these various explanations. This nib improves the appearance of a saw—just how much, one cannot realize until he takes the trouble to file the nib off and then look at the saw. This is probably the only reason for it. It has been used as far back as Disston saw makers remember—and that is back to the beginning of the industry."—K. L. Zimmerman, Henry Disston and Sons.

A Regluing Job

Q. 575. I have a large floor lamp all turned out which has proved to be poorly glued. During dry weather cracks will appear along the sides and in wet weather they will close up. Some suggest that I should finish the lamp during wet weather when the cracks disappear. Others say that during dry weather the cracks will reappear and crack the finish, and that I should finish the lamp during dry weather, filling the cracks. Those I first mentioned come back with the declaration that if I follow the latter method the crack will close in wet weather squeezing out the filler. What would you suggest?—I. W. S.

A: If the lamp belonged to me, I should open, dress and reglue all joints, recentering on the lathe when dry and running a sizing cut just enough to clean up to new wood again, after which I would refinish the lamp, for it has been my experience that when glue joints once start, like Tennyson's brook, they run on forever. The only other alternative is to wait until the wood is at its driest and the cracks at their widest. Make up a glazing putty of dry lead or zinc, shade with pure pigment colors ground in oil to produce a match shade one tone deeper than the color of the lamp, and use varnish as a thinner for the putty to make a soft but stiff glazing putty. This should be worked into the cracks with a spatula or flexible putty knife, allowing the glaze to round up slightly above the cracks.

Let harden for one week or more in a warm room and sand with a mixture of one part raw linseed to three parts gasoline and a 6-0 paper, being very careful not to sand any white edges adjacent to the joints.

Apparently this is a varnish job and after the putty glaze has dried two or three days subsequent to sanding, the work may be given a coat of suitable varnish stain, which when dry and sanded may be followed with a coat of Clear varnish to be rubbed for finish as desired. This varnish putty glaze dries rock hard and should not squeeze out of the joints. My recommendation, however, is to reglue the job with high grade glue and settle the matter once for all.—**Ralph G. Waring.**

Clay for Gesso Work

Q. 586. Could you furnish a formula or recipe for preparing and making Persian or Polychrome Clay?—D. D. W.

Q. 579. Could you furnish a formula for making Italian Art Clay for polychroming through your Questions Department?—M. E. T.

A: There is no such thing as Persian or Polychrome Clay. The word Persian in this case is probably used because of the fact that Bolus or Gilders' red clay is mined either in Southern France or Armenia. This red clay has nothing to do with the question implied by Persian or Polychrome Clay in this instance. Manufacturers and commercial houses now prepare many modifications of the old Italian Gesso compositions giving names, such as Italian Art Clay, Persian or Polychrome Clay, Jesso, etc., making various claims for these modified gessos for the purpose of gain.

Gesso is an Italian name, pronounced Yes'o, which means a mixture of chalk or a plaster of gypsum. This gesso is a very old composition, having been used since ancient and medieval times by craftsmen in the making of ornaments by spreading on, with a brush, the mixture, or building up ornaments of a thicker mixture. It is probable that the gesso sold, under whatever name, is made of calcium as a base, oil and resinous ingredients mixed into the material to be spread upon surfaces, edges, and corners of objects for polychroming and gilding. The exact formulae of these compositions are kept secret by the manufacturers. These various gessos or art clays are now sold in paste form in small tins, and when spread upon the surfaces have the property of adhering and hardening.

One form of gesso is handled by the Milton Bradley Company, Springfield, Mass, and is sold as "Jesso." Another is sold under the name of "Italian Clay" by the Coover Studio, Lincoln, Nebraska. Gesso is also handled by and may be obtained from the Fireside Industries, Adrian, Michigan. Work along these lines is now being demonstrated to women in the department stores throughout the country. Thus, gessos or Italian art clays can be bought in any up-to-date department store or paint store.

GESSO (Jes'o)—COMPO (Italian)

Formula:

1st Step—Mixture 1:
2 parts of varnish.
4 parts of boiled linseed oil.
Mix cold.

2nd Step—Mixture 2:
Gilders' bolted whiting in water to consistency of whipped cream—15 parts.
Soak flake glue in water until dissolved. Heat in water—7½ parts.
Mix warm.

3rd Step—
Intermix batches 1 and 2, and boil the mixture ten to fifteen minutes in water.

4th Step—
Strain and keep in stone jar or glass container having tight cover.

This is Gesso for stipple and bas relief with brush. It differs from "Compo" only in consistency and in proportions of ingredients. Thus, for ornaments modelled by fingers, the ingredients and their proportions are varied, the mixture made thicker and is then called "Compo." For plain surface or body coating the mixture is made thin and is composed of whiting, glue and a small proportion of oil only. The varnish contains lac and resinous matters which serve to prevent decomposition of the mixture and to harden and toughen it.—**C. A. Kunou.**

Staining Veneers

Q. 587. We would like to secure some information, or a formula if possible, on how to dye wood veneer, such as poplar 1/16" and 1/8".

A.: If the veneer is to be used as inlaying material it should be boiled in a suitably colored water stain and then redried under pressure in order to straighten out. If the wood is veneer already applied to the core, then it should be sanded and stained as in standard finishing room practice. Further than this there is little to be said owing to the very indefinite phrasing of the question as regards the use of the wood and the color to be given.—Ralph G. Waring.

Yew Wood for Archery

Q. Can you supply me with the names of dealers of Yew wood suitable for archery purposes?

Oregon Yew can be obtained from the Carman Mfg. Co., Portland, Ore., or the California By-Products Co., 2067 San Bruno Ave., San Francisco, Calif. Mr. D. R. Smith is in charge of the archery department. The last mentioned firm cuts yew particularly for archery purposes.

Second-growth hickory may also be used for making bows with considerable satisfaction. However, it must be second-growth and the wood must be split carefully with the grain. For arrows boxwood, birch, or maple may be used.

STANLEY EQUIPMENT IS STANDARD EQUIPMENT

Three new Stanley Steel Planes

THE Stanley Line now includes 3 steel planes of the Bailey type. These are light in weight and practically indestructible, making them admirably suited for school work.

These planes embody the features of accurate adjustments and good balance which have made Stanley Bailey Planes accepted everywhere as the best.

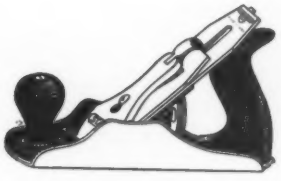
– – – –

The Stanley Catalogue No. 34 should be in the hands of every manual arts supervisor and instructor. It lists and shows pictures of over 1,500 items, as well as detailed drawings, of their construction and adjustment.

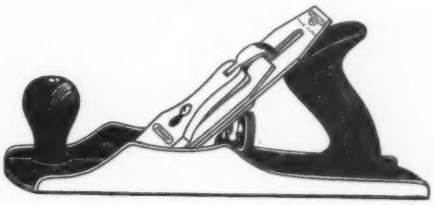
In addition, the appendix gives a number of tables covering subjects pertinent to woodworking.

THE STANLEY RULE & LEVEL PLANT
Educational Department
New Britain, Conn.

New York - Chicago - San Francisco - Los Angeles - Seattle



Stanley Steel Smooth Plane No. S 4



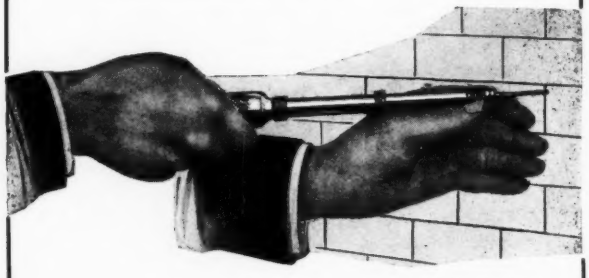
Stanley Steel Jack Plane No. S 5

Stanley Steel Block Plane No. S 18

STANLEY TOOLS

You should have a copy of Catalogue No. 34 by all means. Send for it before you make your spring specifications.

Good Schools Deserve "Yankee" Tools



It's just play to bore holes with a "Yankee" Automatic Push Drill.

Like all "Yankee" Tools, the design of "Yankee" Automatic Drills is so ingenious and the construction so superior, that time and labor are reduced to a minimum.

The action is so smooth that practically no effort is needed to drill holes — this means speed.

"YANKEE" Automatic Push Drills

No. 41 (Illustrated) Drill point revolves backward in upward movement of handle to clear chips. Eight drill points 1/16 in. to 11/64 in., in handle.

No. 44 Has spring with Adjustable Tension to regulate strength suitable for difference in hard and soft woods, or for large and small Drill Points. Turn cap on handle to get any tension you need. Eight drill points 1/16 in. to 11/64 in., in handle.

Some other "Yankee' Tools

Plain Screw-drivers	Ratchet Hand Drills
Ratchet Screw-drivers	Automatic Feed Bench Drills
Ratchet Bit Braces	Ratchet Tap Wrenches

Vises, Removable Base

Dealers Everywhere Sell "Yankee" Tools

"Yankee" on the tool you buy means the utmost in quality, efficiency and durability.

Tool Book Free — Tells all about the famous "Yankee" Tools. Write for your copy today.

NORTH BROS. MFG. CO., Philadelphia, U. S. A.

"YANKEE" TOOLS

Make Better Mechanics

NEWS AND NOTES

Occupy Vocational School. The new vocational school at El Paso, Tex, erected at a cost of $240,000, was occupied this year. The school offers trade training along various lines and there is an attendance of 475 pupils.

Evening Course in Heating. A practical, free, eight-night course in warm air heating was offered in February, at the Lane Technical High School, Chicago, Ill. Of the eight sessions, four featured practical talks on warm air heating by men of national reputation. Classes were held twice each week for four weeks.

Printing Department Introduced. A printing department has been established in the South high school, Youngstown, O., under the direction of W. C. Giersbach. The school has modern equipment costing about $5,000. The printing department takes care of school printing. Two days of the week are devoted to lectures for which the students are responsible and the remaining three days of the week to work in the various departments. The department has from 28 to 30 students in each class, whereas the equipment provides for only fifteen students at a time.

Commencement Programs Turned Out by Printing Department. The printing department of the Boys' Technical High School, Milwaukee, Wis., designed and printed the programs used at the commencement exercises of the school in February last. The printing was in black, on a cream paper, and represented a very excellent job in school printing. The program was enclosed in a suitable envelope upon which was inscribed the monogram of the school.

Cooperative Industrial Course. The cooperative course at Lansing, Mich., has given evidence of substantial growth, with 147 boys enrolled and 47 employers represented on the cooperative list. The greatest difficulty, it is revealed, is not in finding or placing boys, but in overcoming the prejudice against employing boys under 18 years of age in industry.

Blue Print Reading Classes. Two evening classes in blue print reading have been formed at Lansing, Mich., for building tradesmen and sheet metal workers. The shop mathematics class attracted an enrollment of 27 men.

First-Year Carpentry. The class in first-year carpentry at the Boys' Vocational School, Atlantic City, N. J., has produced many useful articles, as follows: bleachers for the gymnasium, a medicine cabinet, and screens and tables for the cafeteria.

Automobile Mechanics. In the first-year automobile mechanics classes at the Boys' Vocational School, Atlantic City, N. J., the study and making of blue prints has been taken up. Tools and parts of automobiles have been studied and drawn, and lectures on the repairing of various parts of the automobile have been an important part of the work.

Painters' and Decorators' Class. The class for painters and decorators at the Boys' Vocational School, Atlantic City, N. J., has been well attended and some of the panels developed in the classroom have attracted the attention of other students. The units carried out have included the mixing of colors, stencil design panel for mural decoration, and ornamental design. The work includes both lectures and practical jobs in painting and decorating. At the present time, the class is working out a series of twenty panels suitable for wall treatment in private or public buildings. The panels will be submitted in a country-wide contest and will be exhibited in New York.

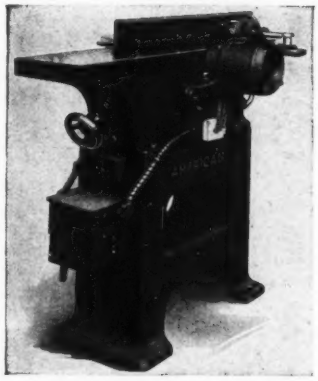
Improvement Courses for Teachers. The New Jersey Department of Public Instruction, in a recent report on professional improvement courses for vocational and continuation school teachers, has stated that more than ninety per cent of the full-time teachers in the day vocational schools and continuation schools of the state are taking courses of instruction designed to improve the quality of their teaching. These teachers are not confined to any one line of work, but come from agriculture, home economics, trades and industries, and continuation schools. The courses are conducted by the state education department and are given at Newark, Atlantic City, Bayonne, Passaic, and Jersey City.

Flower Poster Contest. A "share your flowers" poster contest was held in March by the National Plant, Flower, and Fruit Guild. The purpose of the contest was to offer opportunity to high school students to put their artistic ability to practical use, and to aid in a movement to spread good cheer among cripples and shut-ins through the gifts of flowers and plants from those more fortunate. Twenty-one prizes totaling $195 were given. The winning poster was shown at an exhibition held in New York immediately following the contest.

Industrial Arts Exhibit. A large collection of panels, showing mounted samples of typical shop problems, was recently exhibited at the University High School, Ann Arbor, Mich. The panels represent current practices and problems in many of the best school systems of the state. They were brought together as a service to superintendents, principals, supervisors, and teachers of industrial-arts and vocational subjects. Practically every type of work found in the school shops of the state was represented and in some cases, there were several of each type. The following list gives an idea of the scope of the work covered: Auto-mechanics, bench metal-work, electricity, drawing, household mechanics, forging, machine shop work, metal patternmaking, printing, sheet metal work, woodwork, wood pattern making, wood turning and foundry work.

Cooperative Course in Automobile Mechanics. An unusual type of cooperative course has been introduced in the vocational department at Three Rivers, Mich. The course is designed for boys wishing to become automobile mechanics.

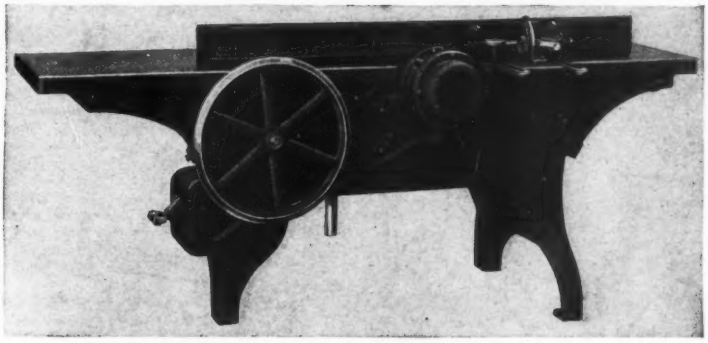
(Continued on Page 28a)



American No. 1 Bench Jointer

Knowledge Gained on American Machines will never Desert You

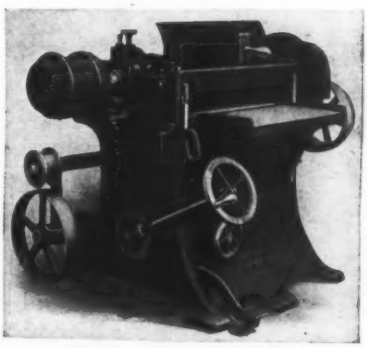
Training in Shop Practice should always be done on real shop machines.



American No. 1 Buzz Planer and Jointer

American Machines spring from the highest requirements of the industries. They are industrial machines.

"The tools of school are the tools of life"



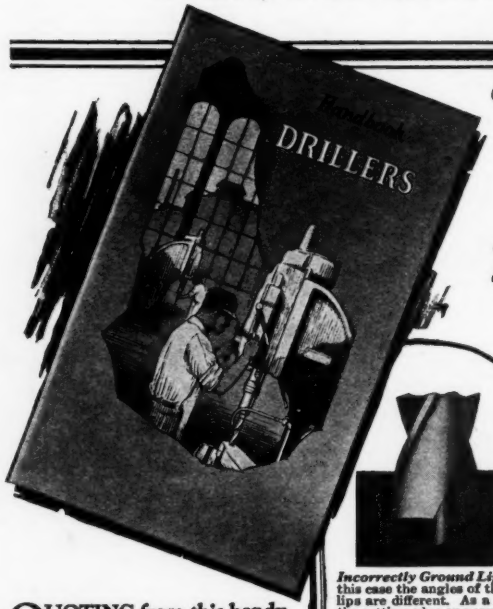
American No. 1½ Single Surfacer

Yates-American Machine Co.

Educational Department

ROCHESTER, N. Y.

Why are some drilled holes larger than the drill?



QUOTING from this handy Handbook for Drillers, the answer is:—"If we get the 'Point' in the center, but different angles on the cutting edges—or, suppose we get equal angles on the cutting edges—but, on measuring, we find the lips are of different lengths—the result will be a hole actually larger than the drill."

The importance of correctly ground lips, and correct angles on the cutting edges, together with a host of other equally valuable information about drills and drilling practice, are thoroughly covered in this 48-page textbook.

Handbook for Drillers is used by hundreds of technical, vocational and manual training schools and colleges because it is the complete textbook on the subject.

To help further a better knowledge of twist drills and how to use them properly, we are always glad to send copies of the Handbook to school directors and instructors in any reasonable quantities for the use of their classes.

Incorrectly Ground Lips. In this case the angles of the two lips are different. As a result the cutting edge on your left is doing most of the work while the one on the right is removing only a small portion of metal. Note that the hole is *larger than the drill.*

Incorrectly Ground Lips. Here the *angles* of the lips are equal but their *lengths* are different. Here again the hole is much larger than the drill and the punishment to the tool is terrific.

Incorrectly Ground Lips. Here the angles of the lips are unequal and the lips are of different lengths. Note the effect on the hole.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND NEW YORK·CHICAGO·LONDON

TRADE MARK REG. U.S. PAT. OFF. AND FOREIGN COUNTRIES

Manufacturers of Carbon and Cle-Forge High Speed Drills for every purpose; "Mexso" Super-Carbon Drills; Hand, Jobbers' and Shell Reamers; "Peerless" High Speed Reamers; "Paradox" Adjustable Reamers; "Quick-Set" Reamers "Spirex" Machine Taper Pin Reamers; Chucking Reamers for Turret Lathes; Counterbores; Countersinks; Sockets; End Mills; and the "Esy-Out" Screw Extractor.

(Continued from Page 26a)

Under the plan, each employer agrees to take two boys into his organization. The boys are enrolled in the automobile mechanics course in the high school and are expected to follow it for four years.

During the first three years, one boy in each pair works in the morning and attends school in the afternoon, while his partner attends school in the morning and works in the afternoon. In order that the work may be profitable, the boys are changed from one garage to another every six weeks, providing varied experience which could not be duplicated in the school. The student has then acquired twelve units of high school work, a great deal of valuable experience, but he does not receive any pay. The full time during the fourth year is spent in one garage or repair shop, at a prearranged rate of wages which increases every two months. At the end of the fourth year, the pupil is given an industrial diploma from the high school which is recognized as an evidence of merit. In addition to evidence of accomplishment, the student has received a training which he could not obtain at any one garage.

A report card is maintained to record the pupil's progress, the work he has done and his attendance. Provision is made on the card for employers to make suggestions regarding the boy and his education based upon the observation of him at his work.

The advantages claimed for the plan are: It removes the necessity for purchasing equipment for the school; it provides the pupil with varied experiences under actual working conditions, it creates and maintains the interest of the employer in the school work, and it secures for the pupil some recognition of the effort he expends.

Evening Drawing Course. A Smith-Hughes evening drawing course was conducted two evenings each week for ten weeks at Bay City, Mich., under the direction of Mr. L. L. Yeakey.

Series of Problem Sheets. A series of job or problem sheets, each containing information and useful data, as well as problems, has been worked out by Mr. Stanley Radford of Saginaw, E. S., Mich. The sheets are in blueprint form and become the property of the student as rapidly as he completes his problems.

Blue Print Reading Classes. Two evening classes in blue print reading have been formed at Lansing, Mich., one for building tradesmen and one for metal workers. The course in shop mathematics has an enrollment of 27 men.

Industrial Arts Association Revived. The Industrial Arts Club of Cincinnati, once a flourishing organization but which had fallen into abeyance for a year or more, was reorganized on Saturday, February 6th, following a meeting of industrial arts teachers. The meeting was attended by 55 of the 68 members of the department.

Dean L. A. Pechstein of the College of Education, outlined a course in industrial arts education and offered to evaluate credits for teachers desiring college graduation.

Mr. C. R. Walker presented a report on the principles underlying the recent recommendations of the high school teachers for an increase in salary. He suggested that the industrial arts teachers appoint a committee to study the subject and make a report. A committee of nine was appointed for this purpose, with instructions to report at the next meeting.

Issue Hand-Colored School Sheet. The industrial arts classes of the State Home for Boys at Jamesburg, N. J., has issued a school paper of four pages, illustrating the work of the classes. The sheets are mimeographed and hand-colored by the pupils and are issued under the title of the "M-E Tatler."

Evening Trade Extension Courses. Evening trade extension classes have been formed at Boise, Ida., with classes in blue print reading and estimating for carpenters, automobile mechanics for garage employees, and paper hanging for employees of interior decorating houses.

Extend Scope of Vocational Work. The school authorities of Portsmouth, Va., have planned an extension of the work to embrace sheet metal, electrical work, machine shop instruction, and automobile repair.

Plan Trade Courses. The school board of St. Joseph, Mo., has made plans for eight tentative trade courses. Among the subjects are electricity, contracting, shop mathematics, radio mechanics, window decoration, sewing, millinery, painting and decorating.

Class for Machinists. A class in mathematics for machinists has been organized at the Reynolds high school, Winston-Salem, N. C. The course includes a study of fractions, powers, square root, right triangles, thread cutting, gear calculation, and simple shop trigonometry.

Evening Trade Courses. The vocational school at Wausau, Wis., opened the second semester with evening courses in drafting and blue print reading for carpenters, mechanics, and machinists.

Cooperative Vocational Course. A cooperative course in vocational training has been adopted at Lancaster, Pa., through the aid of various manufacturers and civic organizations. Under the plan, the prevocational training begins in the junior high school and the actual work of learning a trade begins in the senior high school.

The new system goes into effect next September and begins with fifty boys working two weeks in the shop and two weeks in school on an alternating plan. An appropriation of $3,300 has been made to cover the expense of the school in introducing the system.

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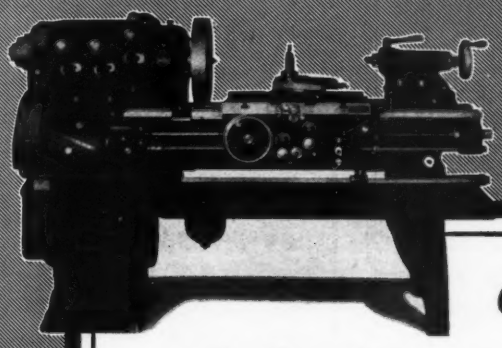


and now —

The Massachusetts Institute of Technology uses The

MONARCH Helical Geared Ball Bearing LATHE

as a part of their Metal Working Equipment.

The prestige of this Institute—the corner-stone of Massachusetts' enviable system of vocational education — attracts students from the four corners of the civilized world.

In choosing the equipment for these students, the directors of the Institute must base their choice upon equipment that will give students the greatest possible amount of experience.

We are proud of the selection of the MONARCH Engine Lathe as a part of the Institution's metal working equipment — proud that it has been selected solely upon its merit, after careful consideration, as the type of equipment necessary for the high degree of training which Massachusetts "Tech" gives to its students—a training which has been so creditably reflected on the Institution by its graduates.

We shall be glad to plan your vocational metal working shop. Give us a statement of your requirements and let our Free Engineering Advisory Service plan your shop, giving you an accurate estimate of the entire equipment cost. This service is gladly rendered without charge.

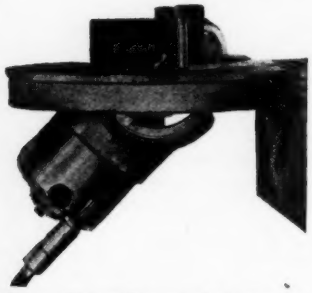
THE MONARCH MACHINE TOOL COMPANY, 404 OAK STREET, SIDNEY, OHIO.

Students Turn Out Professional Work

with Carter Shapers and Routers

So easy to operate are the Carter Electric Router and Shaper that students can turn out real professional work in a few trials. Students take to Carter machines because of their ingenious simplicity and the neat work they accomplish. With the various attachments the Carter Shaper or Router can be used for hundreds of different jobs. They are especially adapted for cabinet work or furniture making. Below are listed only a few of the ways in which you can use Carter Machines in your school shop.

Carter Hand Shaper, cutting a fancy beveled edge on a jewel box. Gives the same effect as hand carving, only neater.



Carter Hand Shaper with Bench Shaper Table. Tilting arrangement provides for making surface and corner cuts. Bench Table attachment, $22 extra.

Carter Router motor in Beading and Fluting attachment. Attachment, $15 extra.

A Few of the Uses for Carter Machines

With quickly changeable attachments the Carter Shaper motor can be used as a Hand Shaper, Bench Shaper, Bench Grinder, Buffer, Veneer Trimmer, Small Portable Saw, Corner Beader, Hand Drill, Tool Sharpener, etc.—the Router Motor can be used as a Router, Veiner, Beader and Fluter, Paneler, Mortiser, Veneer Patcher, Inlay Machine, Core Box Router, Hinge Butt Router, Newspaper Router, for free-hand carving, etc.

In Use From Coast to Coast

Hundreds of Grammar Schools, High Schools and Colleges from coast to coast are using these machines in their Manual Training, Printing and Maintenance Departments. Upon request we shall be glad to furnish a list of schools nearest to you.

Carter Hand Shaper
Price $32.00

Carter Router
Price $42.00
Attachments extra.

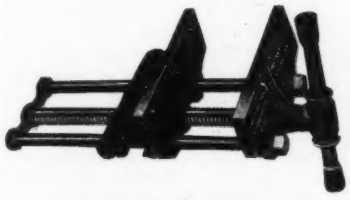
Immediate delivery on any of our machines.
Write us for complete information.

THE R. L. CARTER CO., INC., 1208 Chestnut Street, Phoenix, New York.

CARTER PRODUCTS

Morgan Vises for Machine and Wood Shops

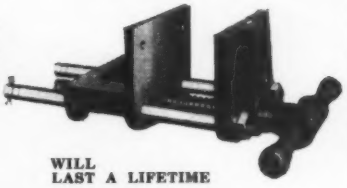
QUICK ACTION WOODWORKER'S VISE
(TOLES PATTERN)



MORGAN VISES GUARANTEED TO GIVE YOU THE SATISFACTION YOU HAVE A RIGHT TO EXPECT.

THE MACHINIST'S VISE SHOWN BELOW ILLUSTRATES OUR No. 40 VISE which is recommended for all Metal working departments.

SOLID NUT-CONTINUOUS SCREW VISE



WILL LAST A LIFETIME

The MORGAN line of Vises for Manual Training Schools is most comprehensive in its scope. A style and size for every department.

MACHINISTS' BENCH VISE
Solid Jaw and Stationary Base

Our SOLID NUT-CONTINUOUS SCREW VISE (SHOWN ABOVE) has solved the vise problem in hundreds of schools, both in the United States and Canada.

SEND FOR OUR CATALOG No. 26 ILLUSTRATING OUR complete line.

MORGAN VISE COMPANY, Manual Training Department.
558 WASHINGTON BLVD., CHICAGO.

(Concluded from Page 28a)

Will Install Manual Training Equipment. The board of education of Terre Haute, Ind., will install manual training equipment in the junior high school to be erected in the east district.

Will Erect Vocational Building. The school board of Norristown, Pa., plans the erection of a vocational building to take care of the vocational students entering the Eisenhower high school.

Vocational Department Builds Home. Student carpenters and cabinetmakers of the high school vocational department at Stockton, Calif., recently completed a six-room bungalow residence, at a cost of $3,300, fully $1,000 below the usual cost of construction for such a home.

The present home is the second to be built by the vocational classes of the high school. All of the carpentry and case work was done by the high school boys, and the other work by commercial contractors. The work started last October, and a total of 34 six-hour working days was used to complete the construction. The boys working on the job ranged in age from 14 to 18 years and for most of them it was the first real job in carpentry.

Carpentry Course Attracts Students. The vocational courses being offered at the Deerfield-Shields high school at Deerfield, Ill., have attracted the attention of part-time students. Thirty students have enrolled for eight hours' work, to take such subjects as English, mathematics, drawing and special work.

The apprenticeship in carpentry was planned by the carpenters' union, and covers a four-year period, the apprentices attending school one day a week and taking the subjects helpful to him in the trade, and receiving full pay from the contractor with whom they have signed apprenticeship agreements.

Propose Course in Bricklaying. A course in bricklaying and other branches of the building trade has been proposed at the vocational school, Troy, N. Y. The course will be open to regular apprentices in the building trades who will receive instruction in estimating, designing, map reading and other branches, in addition to practice work in brick-laying.

Missouri Schools Receive Special Aid. Public schools in Missouri offering vocational courses were given $130,000 in special aid from state and federal funds in the last half of 1925, according to a report of George W. Reavis state director of vocational education. It is expected that $226,762 will be received from the federal government during the school year, this amount to be matched with an equal amount by the state. The schools of Kansas City received almost one-half of the total for industrial schools, receiving $20,500, while St. Louis was second with $17,549.

Blue Print Reading and Drafting. Twenty-five men have enrolled in the blue print reading and shop drafting classes being held at the high school, Billings, Mont. A Smith-Hughes master bakers' class is planned in the near future.

Farm Boys Enroll in Agriculture Course. A total of 516 boys in public schools in South Dakota have enrolled in the vocational agriculture course, according to a recent report showing the work accomplished by the department. Of the 427 boys taking the courses in the farming and small-town communities, 46 have chosen courses in farm mechanics, 278 the courses in animal husbandry, and 192 the course in plant production and farm crops.

New Trade School at Los Angeles. The board of education at Los Angeles, California, will receive bids shortly for the erection of the Wiggins Trade School, to cost $650,000.

Complete Auto-Mechanics Building. Evening classes in automechanics opened the second semester at Casper, Wyo., with the completion of the new wing to the auto-mechanics building. The addition was designed by the drafting classes and is well lighted and conveniently arranged for the purpose.

Trade School Pupils Study Paper-Hanging. A vocational training school in painting and interior decorating has been conducted at Omaha, Neb., under the joint auspices of the board of education and the state and federal vocational departments. The students taking the course are skilled craftsmen, as well as apprentice workers, who had completed similar work in painting. This is the second school to be operated by federal and state authorities for the building trades.

New Farm Shop. The vocational agriculture department of the Johnson County, Wyo., high school has recently occupied its new farm shop building. Under the direction of Mr. Sam Hitchcock, teacher of agriculture, the boys enrolled in the course performed practically all the work in connection with the construction.

The building is frame, 24'x48', and has windows above the benches along the wall. A good sized tool room and double doors in one end make for efficient organization and teaching of the work. The building is heated by means of stoves.

New Vocational Agriculture Department. The vocational agriculture department of the high school at Sheridan, Wyo., has obtained quarters in the manual arts building, comprising a combination classroom and laboratory, and a farm shop. The classes go directly from one room to another, thus saving time and confusion in the work.

The department is roomy and well-lighted, has a dark room and store room, and a tool room in connection with the farm shop. Approximately fifty boys are engaged in the work.

BISON BRAND GLUE

100% Adhesiveness

A superior adhesive manufactured by the same process as Pure Food Gelatine, under ideal climatic conditions. This process, and the careful selection of raw material, yields a glue of 100% adhesive matter.

The most vital consideration in buying glue is its keeping properties. The BISON BRAND being 100% pure, its keeping properties are guaranteed.

The unusual adhesive strength and penetrating qualities make it an ideal glue for all requirements of the woodworking industry and school shops.

Uniformity is guaranteed.

Liberal working sample submitted upon request, in Sheet, Flake or Ground form.

HENRY WILHELM COMPANY, INC.

134-136 Tenth Street PITTSBURGH, PA.

Meeting of Oswego "Boys." The Oswego "Boys," founded thirty years ago at Oswego, N. Y., by Mr. A. S. Hoyt, held a meeting this year, with the attendance of a dozen members. The club was formed as a means of inspiration to those leaving the Oswego Normal School for the teaching profession, or to enter business. The next year's meeting will take place on the second Saturday in February. Mr. Hazen Chatfield is president, and Mr. C. H. Hanford secretary.

Mr. Merritt W. Haynes, formerly director of the education department of the United Typothetae of America, has been appointed head of a similar department of the American Type Founders Company at Jersey City, N. J.

Mr. Haynes was for a number of years active in the educational field as a teacher of trade subjects and as principal of industrial schools. He reorganized the vocational school at Bayonne, N. J., and was for ten years its principal. During his service with the Typothetae, he acted as editor of a series of pamphlets for printing instructors and was responsible for the publication of the Printing Instructor, a periodical printed and issued gratis to printing teachers.

In his present work, Mr. Haynes continues the connections originally established with teachers of printing, and in which he had such a large part in promoting the good fellowship developed among this important group in the printing industry.

PERSONAL NEWS

Mr. William Parkinson has been appointed teacher of manual training, bookkeeping and mechanical drawing at Scottsbluff, Neb.

Mr. Robert O. Beebe has been appointed principal of the Boys' Vocational School at West Orange, N. J., to succeed Mr. S. W. Parker, Jr., who has been transferred to the vocational school at Irvington.

Mr. Richard Ernesti, director of art at Colorado Springs, Colo., has accepted the position of art director at Pueblo. Mr. Ernesti will spend alternate weeks in the Pueblo and Colorado Springs schools, the arrangement to be effective in September next. The program of work will be along the line of organization and the introduction of an art curriculum in the Pueblo schools.

Mr. F. M. Treat has been appointed director of vocational education in Wyoming, to succeed J. R. Coxen.

Mr. Treat has had twelve years of teaching experience, in addition to a number of years' experience in machine shop work and the building trades. He was formerly director of industrial arts at Roanoke Rapids, N. C., and previous to that, was an instructor in the University of Indiana in industrial arts. Mr. Treat holds a degree in vocational education given by the University of Wisconsin.

Mr. Charles F. Stonesifer, an instructor of manual training in the Barringer high school, Newark, N. J., whose death occurred suddenly in November last, was a popular instructor in that institution. His unfailing cheerfulness, his ready helpfulness, and his honest dealing with his daily tasks gave him a special place in the school. His ready help had reduced to order the chaos in many a boy's muddled inefficiency and it became a pleasure just to look into his workroom to observe its neatness and air of accomplishment.

Miss Dora M. Rude, who for the past four years has had charge of the home economics department of the Marinette (Wis.) vocational school, has been given a leave of absence to complete her work at the University of Wisconsin. Miss Anna Brack, of the Stout Institute, is teaching in place of Miss Rude.

Mr. C. E. Hulten was elected president, Mr. H. V. Higley secretary, and Mr. G. W. Schefelker assistant secretary of the board of industrial education at Marinette, Wis., following the regular January meeting of the board. Mr. Hulten was appointed to succeed E. A. Mundt, resigned.

Mr. Roy R. Van Duzee, Director of the Industrial Arts Department at West Allis, Wis., has been appointed lecturer in the College of Applied Science at the University of Ohio, for the summer session of 1926. The courses of which he will have charge are "teaching woodwork" and "organization of industrial arts courses." The summer session will begin on June 14th and will cover a period of eleven weeks.

Mr. C. A. Bowman, of Stout Institute, Menomonie, Wis., has been appointed lecturer in education at the University of Wisconsin. He will be on the faculty one-half time and his work will consist of the teaching of handling classes, also some work as coordinator in connection with cooperative classes. The remaining time will be given to special graduate work leading to the master's degree. Mr. Bowman will resume his position as director of the industrial arts department at the opening of the second semester next year.

Mr. Layton S. Hawkins, formerly director of vocational training for the United States Government, has become managing director of the Lithographic Technical Foundation, which has offices in the Aeolian Building, 33 West Forty-second Street, New York City. A fund of $750,000 has been raised for the permanent support of the work and there is every prospect that the sum will be increased to a million dollars in the near future.

Members of the National Association of Employing Lithographers have been instrumental in the establishment of the

(Concluded on Page 34a)

THE JOHNSON FRICTION CLUTCH

100 CLUTCHES

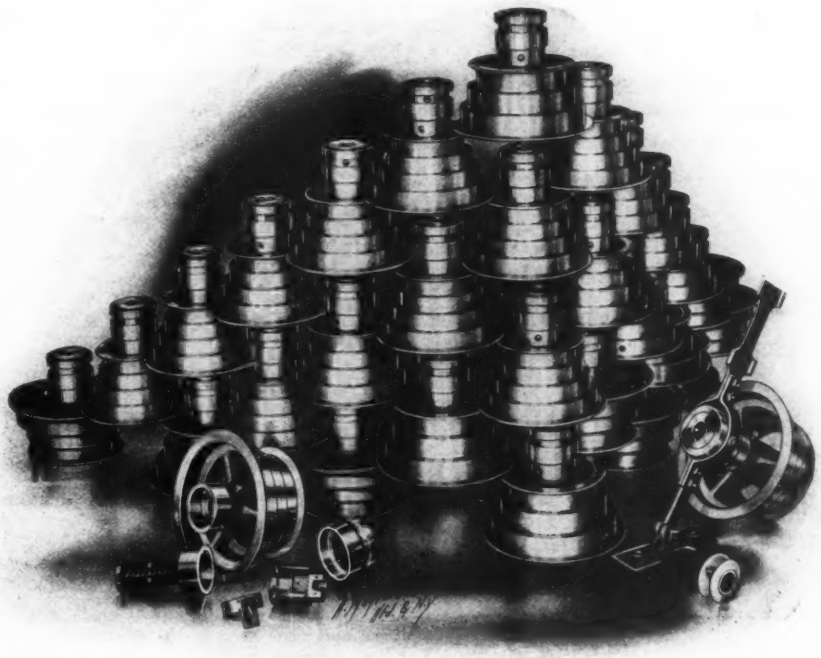
Installed on the Lineshafting

in the Manual Training Department of

The Technical High School

Springfield, Mass.

These one hundred Johnson Clutches have been driving wood-working lathes for the past seventeen years, and are still operating satisfactorily. The illustration below shows a quantity of Johnson Clutches with four step cone pulley mounted on the clutch hubs. These clutches were shipped the Springfield school seventeen years ago.

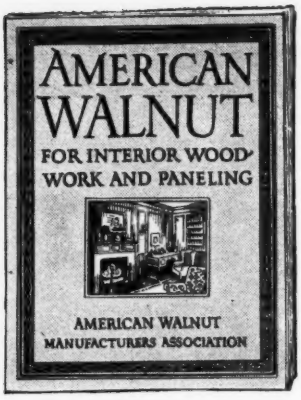


Courtesy: The Technical High School, Springfield, Mass.

Johnson Clutches soon pay for themselves by the saving in power, pulleys, counter shafts, overhead belting and other unnecessary equipment. Standard slow speed clutches are carried in stock for immediate shipment. High speed clutches are made to meet each particular condition. Greater New York and Brooklyn now invariably designate Johnsons in school specifications. Equip with Johnsons.

Write for Catalog "I. A. M."

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.



New facts on American Walnut

These free books tell all about American Walnut and its uses—every manual training teacher will find them useful

YOU will find in these two books a real education in American Walnut, most beautiful and useful of cabinet woods.

"American Walnut for Interior Woodwork and Paneling" contains photographs of paneling treatments and finishes; it gives specifications and costs of a specimen room; it tells you the comparative costs of walnut and other fine woods; it discusses walnut floors and walnut finishes.

"The Story of American Walnut" tells the history of this wonderful wood, how to identify it, and takes you on a little journey through the historic periods of furniture.

We will gladly send you either one or both. Use the coupon below.

AMERICAN WALNUT

"THIS IS THE AGE OF WALNUT"

American Walnut Manufacturers' Association
Room 1252, 616 So. Michigan Ave., Chicago

Please send
"American Walnut for Interior Woodwork and Paneling" .....
"The Story of American Walnut" ..... (Check which)

.....

I. A. 4-26

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Foundation, which has for its objectives the investigation, research, and discovery of subjects, principles, laws and processes of a scientific or technical character relating to lithographic processes, the promotion and encouragement of the training of executives, and the preparation of teaching material for the training and education of lithographic workmen.

Death of Principal Warner. Mr. Charles Franklin Warner, principal of the old Mechanics Arts High School, and first and only principal of the Technical High School at Springfield, Mass., died on January 11th at his home in that city. He was 68 years old.

Mr. Warner was born in Somerville in 1857, and was educated in the public schools and in the classical academy at Hallowell, Me. He attended Colby College, from which he received the degree of D. S. He also completed courses at the State Normal School, Bridgewater, and at Bowdoin College and Harvard University. He became superintendent of schools at Augusta, Me., in 1882, and was teacher of science at Cambridge from 1888 to 1898. He became master of the Cambridge Manual Training School in 1890, and in 1898 went to Springfield as the first principal of the newly established Mechanic Arts High School. The Technical High School to which he was later appointed, was opened in 1906 with fifty pupils, and at the time of Mr. Warner's death had an attendance of 900 students.

Mr. Warner rendered a distinct service to the educational life of Springfield through the pioneer work which he did when the idea of technical education was in its infancy. Throughout his principalship, Mr. Warner strove for high ideals in scholarship.

Mr. E. Q. Brothers, dean of the junior college at Arkansas City, Kans., has become director of evening classes.

Mr. John P. Manning, of McKeesport, Pa., has become head of the department of industrial education at Braddock, Pa. Mr. Manning succeeds Mr. Williams, who has accepted a position at the Texas A. and M. College.

BUYERS' NEWS

TRADE PUBLICATIONS

Walnut for Interior Finish. The American Walnut Manufacturers' Association, Chicago, Ill., has just issued a 23-page, illustrated booklet showing the use of walnut for interior woodwork and paneling. The booklet shows a number of panels illustrating the figure in walnut wood, and offers a number of interior views showing typical rooms, stairways and mantels finished in walnut, and furnished, with simple and artistic accessories of decoration.

The booklet offers a number of specifications for typical specimen rooms, as well as sizes of rooms and comparisons of costs. It discusses in particular walnut floors and finishes and cites the advantages of walnut as a fine wood for interior finish.

Issue Catalog of Portable Machines. The J. D. Wallace Company, Chicago, Ill., has just issued a catalog illustrating and describing the Wallace planers, jointers, circular saws and band saws for school shop use. The firm has marketed a special line of portable machines in order that the shop worker may do his cabinet, pattern, fitting and assembling right at the bench, thus eliminating hand sawing and hand planing, and saving time and power. The machines operate on electric light or power circuit, and are direct motor driven, which eliminates waste and speeds production. They are powerful enough to handle heavy work, and are yet designed and constructed to handle the smallest work with absolute accuracy.

Information concerning the Wallace portable wood-working machines may be obtained by writing to the J. D. Wallace Company, at Chicago, Ill.

Salesmanship Class Sells Atkins Saws. Considerable interest has been manifested in the monthly "sales" demonstrations conducted by the salesmanship class of the Shortridge high school. Indianapolis, Ind. The class holds demonstration sales of such products as household goods, cooking utensils, Atkins steel saws, and products of other manufacturers.

The January sales talk was conducted by Miss Mildred Weaver, as representative for the E. C. Atkins Company, and by Mr. Charles Maloney as buyer. During the "salesman's call," many things were brought out such as the curing of wood for the handles. Silver steel was held up as a standard, and its advantages of quality, evenness of temper and polish were cited, in a way to bring out the ability of the student as a salesman. The ability and persuasiveness of the salesman aroused in the customer a desire for literature, window-display material and selling helps, together with an order for 35 dozen steel saws.

Neither the school nor the manufacturers offer prizes for the stimulation of interest in the salesmanship talks. Miss Weaver was given a credit in salesmanship merely on the basis of the splendid ability she displayed throughout the term.

Miss Mallroy, the instructor of the salesmanship class, devotes much time to the subject and constantly endeavors to bring out the fine points of good salesmanship and how to close a sale. No doubt some of the students may in later years become outstanding figures in the commercial world.

Have You a Little Paper in Your School?

The School News

A facsimile of the front page of a schoolpaper, such as may be published for the purpose of convincing parents of your children of the value of printing in connection with academic and vocational instruction in public schools.

VOL. 2 ANY COMMUNITY, ANY STATE NO. 1

The Value of Schoolpapers

WHAT the newspaper is to the general community the schoolpaper is to the school community. Both publications possess uncommon interest to their readers by the printing of news items, and both have the power of moulding public opinion. One influences mature minds; the other influences the youthful minds. Both are informative and highly educational. Especially is this latter statement true in the case of schoolpapers.

The schoolpaper has one distinct advantage in educational value—it is the product of its readers. To be successful it must represent the combined effort of every class in the school and be of interest to every student enrolled in those classes. The academic classes may be assigned the task of collecting news, preparing interesting articles, and revising the printers' proofs for errors in English construction, spelling and typography; the art classes may have charge of the illustrations and general typographic arrangements; the commercial classes may look after the business end of the publication, such matters as soliciting money for subscriptions or advertisements, making disbursements for paper, inks, etc. The actual work of type composition, imposition, presswork and binding will be done by the printing classes.

No other activity can combine into a single educational unity practically the entire facilities of the institution as does the schoolpaper.

With the installation of printing instruction in a school all the academic work is revitalized. English, spelling, arithmetic, grammar, and art will take on a different meaning to students who have hitherto regarded these studies merely as necessary evils. Taught in conjunction with printing, their great value as vital elements of education is realized.

Request us to send you a chart showing the "Mechanics of Journalism." It is free.

Information: The Education Department of the American Type Founders Company employs the services of professional educators, efficiency engineers and trained salesmen to aid you in establishing printing courses in your schools. With this Company the word "service" is spelled H-E-L-P.

For information write F. K. PHILLIPS, Manager, EDUCATION DEPARTMENT

American Type Founders Company

300 Communipaw Avenue, Jersey City, New Jersey

HERMES

These Are Ideal Class Room Drawing Tables

PHILADELPHIA

There are no better drawing tables for class room use than WEBER HERMES or WEBER PHILADELPHIA. These tables are sturdy and durable. Nothing to get out of order—nothing to be broken. They are built to withstand the strain of classroom wear and tear.

These hardy tables are adjustable—yet they stand as solidly as though fastened to the floor. Like all Weber Materials, WEBER Tables are built by skilled workmen employing only carefully selected materials.

Get the maximum efficiency from your class room by requisitioning WEBER TABLES and WEBER FILING CABINETS. Write for catalog. Address Dept. I. A.

F. WEBER CO.,
1220 Buttonwood St., Philadelphia

BRANCHES:
227 Park Ave., BALTIMORE | 125 So. 12th St., PHILADELPHIA | 705 Pine St., ST. LOUIS

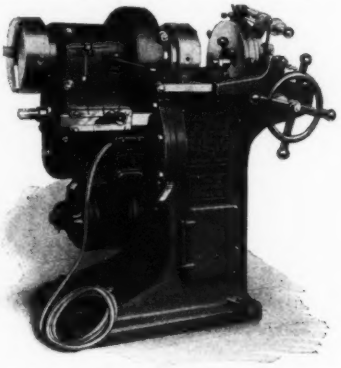
WEBER
Drawing Instruments & Materials

NEW TRADE PRODUCTS

New Pipe-Threading Machine. The Chicago Pipe-Thread Machine Co., of Racine, Wis., has issued a circular describing and illustrating its new Chicago No. 2 power pipe-threading machine for shop work. The machine is the result of fifteen years of developmental work and represents an advanced type for production and precision threading, with the added feature of portability.

The die head carriage is of rugged construction, suspending the die head close to its center. It is supported both front and back by rigid supports which overcome all leverages and strains, resulting in better threading, cutting off and reaming.

A cut-off attachment is built into the rear of the die head and all sliding surfaces are carefully fitted and generous in their dimensions, and gibbed to compensate all wear and maintain rigidity. The cutting-off tool is held at the proper angle and to sharpen it one grinding operation only is necessary.



CHICAGO No. 2 POWER PIPETHREADING MACHINE.

A reamer is located immediately on the cut-off block, and is swiveled to its work for both reaming and chamfering by a handle conveniently located for the operator. A quick clamping device holds the reaming and chamfering tool, which is easily removable for sharpening.

A power switch is located at the operator's left for starting and stopping. When left hand threads are being cut, reverse switches should be specified and the same are furnished at a slight additional cost. Portability has been kept foremost in mind and the design of the machine equalizes the balance.

New Improved Universal Cutters and Grinders. The Gallmeyer & Livingston Company, of Grand Rapids, Mich., have announced a number of improvements in the Grand Rapids Universal cutters and grinders, Nos. 1 and 2, providing for a self-contained motor drive, eliminating overhead work. The No. 1 Universal cutter and tool grinder has a weight of 660 pounds, a capacity for face milling cutters of 12 inches, has a longitudinal movement of 15 inches and swings between centers to a length of 20 inches. The machine has a ¾ h. p. motor, mounted in the base and belted through the column to the grinding wheel spindle. A swing door on the base makes the motor easily accessible when it is necessary to make bearing adjustments, cleaning the commutator, etc. A ½ h. p. lamp socket motor is built into the headstock to provide for handling cylindrical and internal grinding. The work spindle is driven by means of a worm, providing the necessary slow speed and eliminating overhead drum.

The No. 2 universal cutter, drill and tool grinder is universal in action, being suitable for both drills and all kinds of cutters and reamers. The machine has a weight of 785 pounds, a capacity for face milling cutters of 12 inches, has a longitudinal movement of 15 inches and a transverse movement of 7 inches, and swings between centers to a length of 20 inches.

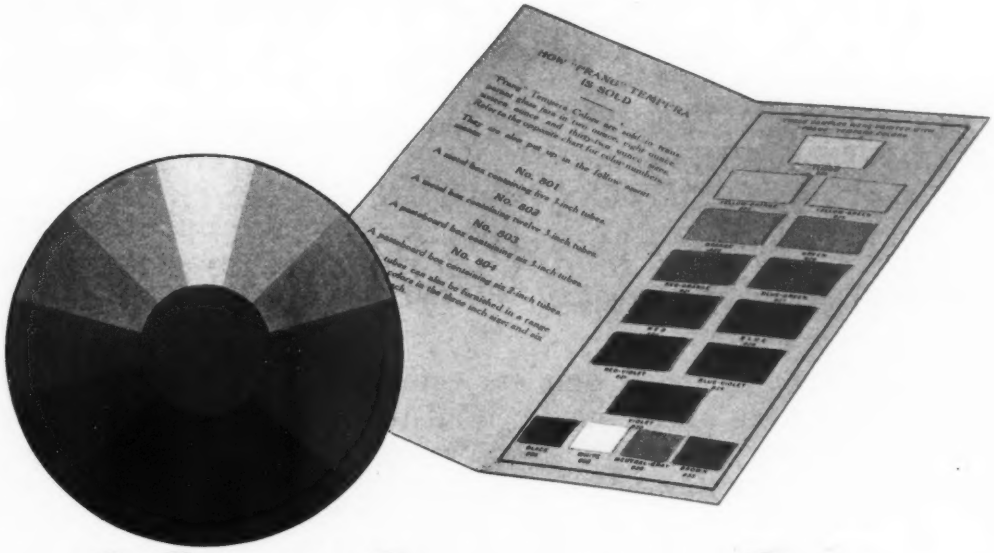
Disston Opens Knife Manufacturing Department. Henry Disston & Sons, Inc., of Philadelphia, Pa., have recently added a machine knife manufacturing department to their branch at Cincinnati, O. The factory will serve users of Disston machine knives in the middle west and south as it is now serving users of Disston saws.

New Johnson Oven Furnace. The Johnson Gas Appliance Co., of Cedar Rapids, Ia., has issued a descriptive circular on its new No. 700 oven type furnace. This furnace is an atmospheric furnace, very well adapted for carbonizing, tempering and annealing, and does not require the use of a forced air blast of any kind.

The furnace is durable, rapid in operation, and gives perfect results, since the heat may be regulated to a fine degree up to 2,300° F.

The firebox is heavily lined with fire brick, the door is large in size, and balance weights make it easy to open and close. The furnace is furnished with six large Bunsen burners, each with shut-off valves so that the temperature is easily regulated. It is furnished complete for $180.

Information concerning the Johnson oven furnace may be obtained by writing to the Johnson Gas Appliance Co., at Cedar Rapids, Ia.



A Really Important Reason

"Prang"
Tempera Colors
Yellow
Yellow-Green
Green
Blue-Green
Blue
Blue-Violet
Violet
Red-Violet
Red
Red-Orange
Orange
Yellow-Orange
White, Black, Brown
Neutral Gray

"Prang" Tempera colors are brilliant - but that's not the biggest reason.

"Prang" Tempera colors "go on" excellently; cover completely and dry evenly. But even these are not the ***"big"*** reasons.

"Prang" Tempera colors are of the right consistency. They are ready for use with little or no thinning. They are never lumpy - they will not dry in the jar. But the best is still left unsaid.

The most important fact of all to you should be this - "Prang" Tempera colors are based on the 12 standard spectrum colors of the color circle. These colors can be inter-mixed. With this simple palette of 12 colors, and black, white, neutral gray, and brown, you can accurately and easily reproduce any tempera color under the sun.

We guarantee "Prang" Tempera colors. That means your money back if you are dissatisfied.

Send for color card, showing actual colors.

The
AMERICAN CRAYON COMPANY
NEW YORK · DALLAS · SAN FRANCISCO

HOME OFFICE AND FACTORIES

"Old Faithful"

23 HAYES AVENUE SANDUSKY·OHIO

VOCATIONAL SCHOOL

DIRECTORS, SUPERVISORS AND INSTRUCTORS WILL PROFIT BY THE POSSESSION OF OUR 350 PAGE CATALOG SENT GRATIS UPON REQUEST.

WHEN WRITING } ***BE SURE TO GIVE US THE NAME OF YOUR SCHOOL ALSO SPECIFY YOUR POSITION***

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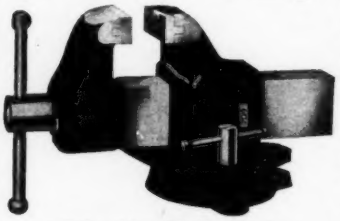

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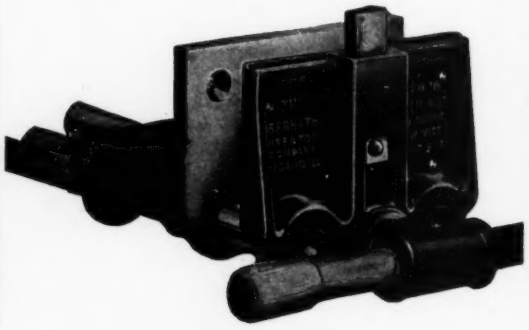

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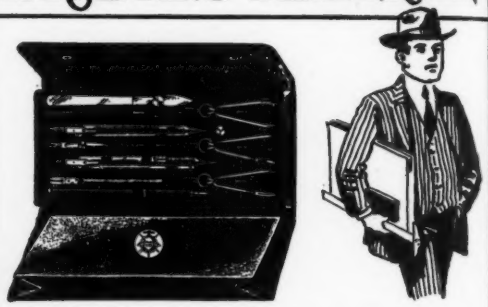

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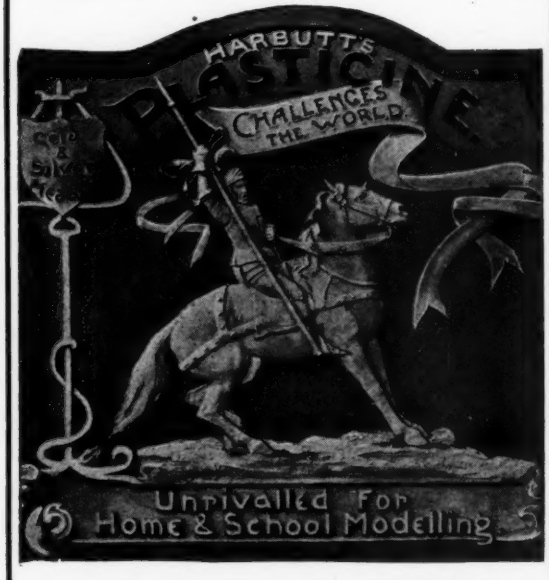

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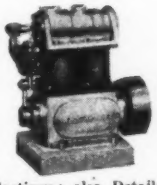

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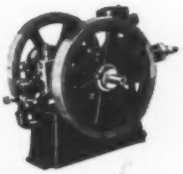

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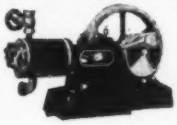

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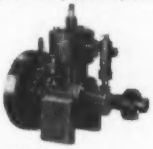

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From the practical educator's point of view ◆ ◆ ◆

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ASHLAND, OHIO

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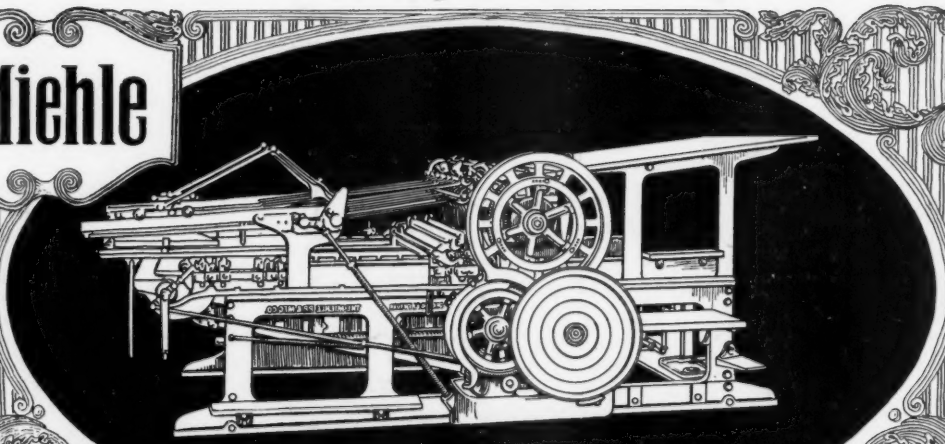

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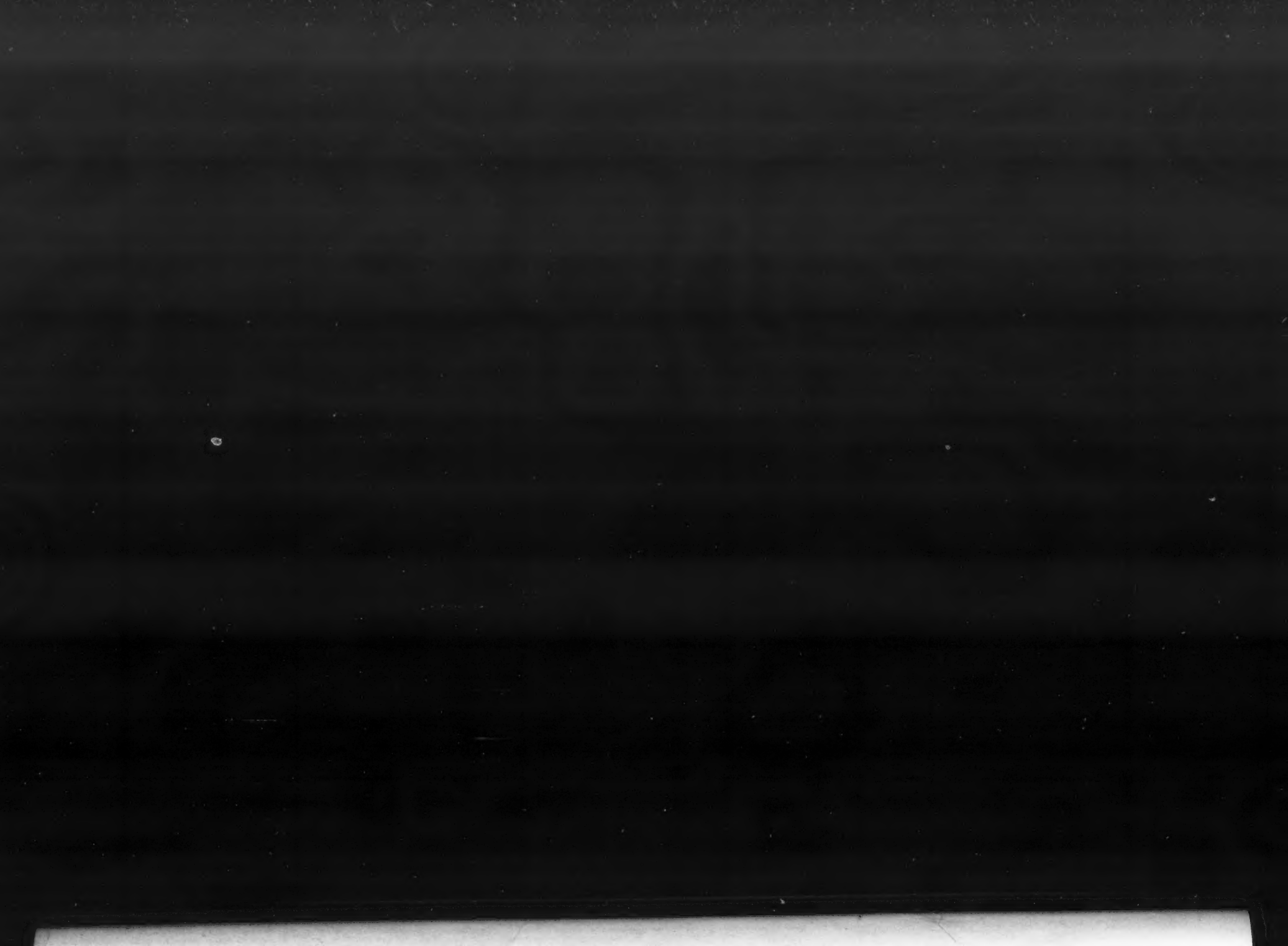
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